FOOD MANUFACTURE

Vol. XIX, No. 2 February 1, 1944

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Published on the first day of the Month
by
LEONARD HILL LIMITED
17, Stratford Place, London, W.1
Telephone: Mayfair 7383

SUBSCRIPTION

Single Copies	1s.
Annual Subscription	10s.
Abroad	12s. 6d.

The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Dehydration Propaganda

IN this issue is published an article on the future of dehydration. Since it was written, the subject has been approached from a somewhat different angle by Mr. Robert A. Templeton, of F.M.S. (Potato Factories), Ltd., in *The Farmers Weekly*.

Mr. Templeton considers that "it is high time that someone having the requisite knowledge should speak up and question the wisdom and accuracy of the propaganda on dehydrated foods which has appeared in the past three years." In the first place, he flatly denies that anything has been brought forward during this period which can be said to be an advance upon pre-war knowledge. He enumerates the four principal processes of vegetable drying: (1) the conversion of potatoes or vegetables into a dried product for cattle feed; (2) the same process applied to the best quality of vegetables which, if subjected to additional grading after drying, can be used for human consumption in the form of powder; (3) the strip-drying process; and finally (4) the "potato mash" process.

Mr. Templeton calls attention to the fact that process (3), upon which the Ministry of Food has centred their attention, involves very high costs—from 1s. to 2s. per dry lb. of vegetables which, if offered to the public, would have to be sold at a price five or six times as much as that at which could be normally bought, under peacetime conditions, the equivalent quantity of nutritive matter in fresh vegetables.

The "potato mash process" aims at producing a powder which, with the addition of hot water, will produce a perfect mashed potato. There are possibilities in this, but Mr. Templeton says it is too early yet to make sweeping claims as to its future under peacetime conditions. He issues a warning that "the natural fascination in this idea of 'dried vegetables' is being over-exploited almost without regard for what may be described as a sensible appraisement of the practical issues and difficulties which arise. The result is that the interest of the public is being stimulated very rapidly and to a considerable extent, and the anxiety of the producers is being allowed—if not encouraged—to expand itself likewise upon a foundation which contains not a little artificiality and consequent unsoundness."

The Cartel and the ICI

The cartel has been described by its opponents in the U.S.A. as an "international octopus, a financial fifth column, and the Four Horsemen of the Apocalypse", while its defenders have tried to describe it as a striving for international order, an enlightened internationalism, and a conduit for the interflow of civilisation.

The former view has been implemented with the filing of a suit charging Imperial Chemical Industries, Limited, and the American DuPont de Nemours Company with the violation of the Sherman Anti-Trust Act, and with "conspiracy" or cartel agreement to divide up world markets in certain chemical products dating from before 1930. On January 7 Lord McGowan, chairman of the ICI, replied to statements by Mr. Wendell Burge, United States Assistant Attorney-General, in charge of the Anti-Trust Division. The statements, said Lord McGowan, clearly indicated that in Mr. Burge's view the activities of ICI and the other company named had frustrated the Allied war effort and involved collaboration with the enemy.

Lord McGowan issued a flat denial of what he termed the iniquitous charges. "We have," he stated, "lent freely of our ablest colleagues, staff and workers, including thousands of key men, to all Government Departments and factories who have asked for them. For the purposes of the war, we have placed our research, our patents, our processes, and all our knowledge—technical and commercial—unreservedly at the disposal of His Majesty's Government and, through them, to the Governments of the United States and Russia."

Lord McGowan made it clear that he and his colleagues were prepared to meet the charges fully and in detail at the proper time and place.

The New Milk Marketing Scheme

Progress is being made with the preparation of the new marketing scheme for milk distribution and manufacture, but some months will probably elapse before the scheme is submitted to the Minister of Food. A draft scheme based on the Milk Products Marketing Scheme now in abeyance has been prepared. This course was foreshadowed in FOOD MANUFACTURE. The draft is being considered by the various interests represented on the Central Milk Distributive Committee. These interests are so numerous and so varied that some time may be necessary before agreement is reached.

Little difficulty should be experienced in regard to milk products because the ill-fated Milk Products Scheme was based on agreement. In widening the scope of this scheme to include liquid milk distribution the new interests involved include private retailers ranging from one-man businesses to combines, retailers of T.T., sterilised and other special milks, co-operative societies and producer-retailers. These matters are now being considered. One suggestion is that retailers should be divided into five groups based on gallonage, but some sections of the trade would prefer only three groups. An important point to be decided is the balance between manufacture and liquid distribution. All sections, both on the distributive and the manufacturing sides, are so satisfied that a marketing scheme is desirable that no material difficulty is expected in reaching agreement on every point. In fact the Central Milk Distributive Committee regards the marketing scheme as an essential part of the wider scheme of post-war milk policy on which agreement has already been reached. That policy has been outlined in FOOD MANUFACTURE.

Pay-as-you-Earn

Much has been said and written about the advantages of pay-as you-earn income-tax and the relative ease with which the employer may effect the necessary deductions from the wages of the workers.

There are, however, psychological aspects of the matter which do not appear to have been ventilated hitherto although they are very real ones to employers. "To tax and to please no more than to love and be wise, is not given to men," said Burke in a speech on American taxation. By the new method of collecting income-tax, the employer, willy nilly, assumes the rôle of tax-gatherer—an immemorially detested figure. Furthermore, employees, on their part, will not fail to calculate their wages on the basis of the actual contents of their pay packets. The gross amount, as entered in the employer's pay-book, will be no concern of the employee, and eventually the tax will become a charge on the labour bill of the former. It is not, perhaps, difficult to visualise the imposition, in due course, of an entirely new and additional tax on the workers' "spendable" income, thus completing the vicious circle.

Commercial Cheesemaking

Improvements in commercial cheesemaking resulting from researches conducted by the National Institute for Research in Dairying with the aid of grants from the Milk Marketing Board are foreshadowed in a report presented by the Institute to the Board.

This report, covering the period from June, 1941, to July, 1943, states that it has recently been shown that large numbers of streptococci of the fæcal type are commonly present in commercial cheese. They are heat-resistant, and may have public health significance. They may contribute to flavour production, and their numbers may determine the "strength" of the flavour. The rela-

tionship of these findings to the pasteurisation of milk for cheesemaking is being studied.

The practical usefulness of the "pitching test" for consistency of curd at the pitching point has been much increased by the discovery that the accurate timing originally believed necessary can be dispensed with and that, if need be, the test can be done at half speed.

A study of the physical properties of curd in the "cheddaring" process (and its equivalent for Cheshire) has shown that "sectility" (resistance to cutting) is of more importance here than data obtained with the compression rheometer. A sectilometer has been designed and the data obtained with it on both Cheddar and Cheshire curd are being correlated with pitching points and with the quality of the finished cheese. The resazurin test has been proved of value for assessment of milk quality in relation to cheesemaking.

Tribute to Canning Industry Workers

At the Ministry of Food recently over 300 men and women workers in the canned food industry gathered to hear some appreciation of their work in the war effort. Colonel C. E. Beale, from the C.P.O. Division of the War Office, gave a vivid picture of how the fighting man feeds when on active service. "There is dependence on the tin in front-line operations," he said. "For assault, troops must have their food with them." He explained the use of the different packs which were exhibited. Among them were the fourteen-man Compo Case, enough, if necessary, to feed fourteen men for six weeks, and the special packs designed for jungle warfare and for use in the mountains where cold is intense. Each pack has been balanced in food value to give maximum nourishment in minimum space.

Mr. J. King, senior analyst of the War Office, demonstrated the "magical" properties of a tin of soup. He applied a match to a fuse attached to an ordinary-looking tin. In four minutes the soup was boiling hot. He explained that self-heating soup is a triumph for British industry. "Both Americans and Germans have tried to do it," he said. "The Americans were so impressed that they immediately bought a million tins. This soup will be one of our 'Invasion Rations' when the time comes."

A repatriated prisoner of war, who is an officer in the R.A.M.C. and has been doctoring prisoners in various Nazi camps since the days of Dunkirk, expressed praise for canned foods. "Food sent to the camps from England materially helped wounded men to recover," he said. "Fitness of our repatriated prisoners is due to English food."

It was explained to the men and women workers at the meeting that their work was of greatest importance now. They are gathering momentum to reach target figures, ready for The Day.

A Trade Description

An interesting appeal heard recently in the Courts was the case of Evans *v.* British Doughnut Company, Limited, under the Merchandise Marks Act. The Court of Summary Jurisdiction, sitting at Llansantffraid, Montgomeryshire, came to the somewhat surprising decision that a statement on a label that the contents of "Eggstead" was "equivalent in use to twelve eggs" was not a trade description and did not indicate the composition of the preparation; the question of its falsity did not therefore arise, although analysis showed the product to contain the equivalent in protein and oil of 1½ eggs. The Lord Chief Justice, however, took a more realistic view, and said that "the totality of the words used made it impossible to say that the particular words were not an indication of the material of which the goods were composed. The defence had argued that 'contents equivalent in use to twelve eggs' was only a statement as to the value of the goods and not as to their composition, but when all the words were looked at it was clear that this was a trade description". He referred the matter back to the justices to consider the further point whether as a trade description it was false.

Spray-Dried Rose Hip Powder

In a letter to *Nature* (September 25) V. L. S. Charley and A. Pollard record some observations made on the production of a spray-dried rose hip powder. In the autumn of 1942 it was desired to prepare a concentrated rose hip extract with high ascorbic acid potency, but a vacuum-evaporated extract proved to be somewhat unstable. In view of the previous success with the spray-drying of apples, plums and black currants, it was decided to apply the earlier technique to rose hips.

An extract of the fruit was made by boiling the milled hips with twice their weight of water for half an hour, the liquor being removed by hydraulic pressure. By this means a thick pectinous fluid was obtained, which on concentration gave a material with the following analysis:

Specific gravity	...	1·095
Ascorbic acid	...	219 mgm./100 gm.

No attempt was made to remove the pectic substances by enzyme action as the presence of pectin had been found, in previous work, both to aid the process of spray-drying and to assist in the retention of ascorbic acid. The concentrate was spray-dried in a semi-commercial Kestner machine. A smooth, free-flowing powder of very fine texture was produced without the slightest difficulty. Using an air outlet temperature of 85°-90° C., a powder was collected which retained 5·1 per cent. of moisture and 979 mgm. ascorbic acid/100 gm.

—showing a negligible loss due to the drying process.

The powder was gas-packed in cans, and after storage at room temperature for three months showed a loss of not more than 3 per cent. in the ascorbic acid value. (The ascorbic acid determinations were carried out by the method of Harris and Olliver (*Biochem. J.*, **36**, 155, 1942) and checked by the potentiometric method of Harris, Mapson and Wang (*Biochem. J.*, **36**, 183, 1942).

The hips used for the experiment were of poor quality, and very much higher figures should be obtainable with better samples of raw materials. It would appear that the production of such a powder might enable ascorbic acid to be added to certain solid food materials in this form.

Scots Sugar-Beet Crop

The harvesting of the Scottish sugar-beet crop and its subsequent processing at the British Sugar Corporation's Cupar factory have been completed. The season has proved suitable for the cultivation of the crop, states a survey of the campaign made by the management at Cupar. No beets were received seriously damaged by frost. The transport of the huge tonnages by rail and road has been efficient and regular throughout. The average yield of approximately 8½ tons per acre over the whole crop was a great improvement on that of last year, when weather conditions were less favourable. The average sugar content of 17 per cent. was higher than that at most of the English factories. Many individual yields of 12-15 tons per acre, with sugar contents of 18-19 per acre, have been recorded. A record was set up at the factory in that from the start of operations early in October until the close over one ton of clean beet per minute was sliced and converted into sugar.

Vitamin B_1 in National Flour and Bread

At the request of the Ministry of Health, an investigation has been made into the merits of the various methods available for the determination of vitamin B_1 in national flour, in order to arrive at the most suitable procedures for use in chemical laboratories where food analyses are regularly made. A report by the Vitamin B_1 Sub-Committee of the Accessory Food Factors Committee of the Medical Research Council and the Lister Institute includes a comparison of chemical with biological and microbiological assays. The vitamin B_1 content of bread made from one of the flours was also examined in order to determine the effect of baking.

The flours employed were authentic specimens of national flour—*i.e.*, 85 per cent. extraction flour as defined in the Medical Research Council's second report on bread (Medical Research Council, 1941). The bread was baked in a batch of 40 loaves of 2 lbs. each by a usual commercial procedure. The loaves were sliced a few hours after baking and the slices placed on slatted shelves and dried at 37°. Drying was complete in 2 days, when the bread, crust included, was powdered in a laboratory mill.

Early work on which the biological methods are based is summarised in the Medical Research Council (1932) report: *Vitamins: A Survey of Present Knowledge*. The rat-growth method (as employed by Copping) was that described by Chick and Roscoe (1929). The rat-growth method (as employed by Harris), the rat bradycardia method and the "cure of convulsions" method were described by Harris (1940-41).

The literature relating to the original observations which led up to the fermentation method is briefly reviewed in the Medical Research Council (1932) report. The method used in the present investigation is that of Schultz, Atkin and Frey (1942).

In connection with the thiochrome method, the two procedures adopted by the Sub-Committee are given in full in an appendix, with references to the literature.

The Azo method used is that described by Platt and Glock (1943), and is based on the formaldehyde azo method of Kinnersley and Peters (1927) and Prebluda and McCollum (1936).

The results obtained in the collaborative tests by the various methods employed are set out, and show that all methods of estimation yield values which are in good agreement, especially for the flours.

Sale of Salt Fish

The Ministry of Food announce that they are undertaking a big publicity campaign for salt fish and are instructing the housewife how to prepare attractive and nutritious meals with it. It is pointed out in the instructions published in the advertisements that the fish, before being cooked, must be desalted by soaking for at least twenty-four hours and that thick fish needs longer. In the Ministry's notice to trade journals it is stated that "the price structure permits a greater margin of profit to the retailer if he carries out the desalting process himself, but, if this is impossible, he should inform the housewife so that it can be done in the home." A certain amount of ambiguity is introduced in this matter. Apparently the price of 10d. a lb. applies equally to the desalted fish and the fish in its dry state. The question may arise whether the purchaser has the right to *insist* on being supplied with the dry, unsoaked fish. Obviously, by doing so, she is obtaining, at the cost of a little extra trouble but at the same price, an amount of fish equivalent to approximately double that of the soaked fish.

The Confectionery Industry

PROGRESS IN 1943

R. L. KENNY, B.Sc., F.I.C.

THE QUESTION of distribution of manufactured confectionery has been given great consideration in recent months. One of the difficulties to be overcome was that concerning movement in population because it was found necessary to supplement allocations to areas where increases had been recorded either as a result of evacuation or through other emergencies arising as a result of the war. Naturally enough it was only possible to apply such a scheme to definite areas without further subdivision, with the result that any individual town or village in that particular area might still be able to present a genuine case for further adjustment. Such detailed concessions would have involved far too unwieldy a procedure so that such anomalies must still continue. This is the explanation why, in certain towns, all goods available are purchased within the first few days of delivery, with the result that the shops concerned are without stock until the arrival of further consignments. Zonal distribution officers have minimised this problem, and through their efforts the changes due to zoning have taken place, on the whole, very smoothly indeed.

Zoning

The inevitability of zoning had become apparent for a long period before its actual introduction. The scheme had been postponed because of the decision of the Ministry to cut the chocolate ration from 4 ozs. to 3 ozs. per week. This change had made it possible to concentrate production to a further extent, and a certain rearrangement of the original proposals was rendered necessary.

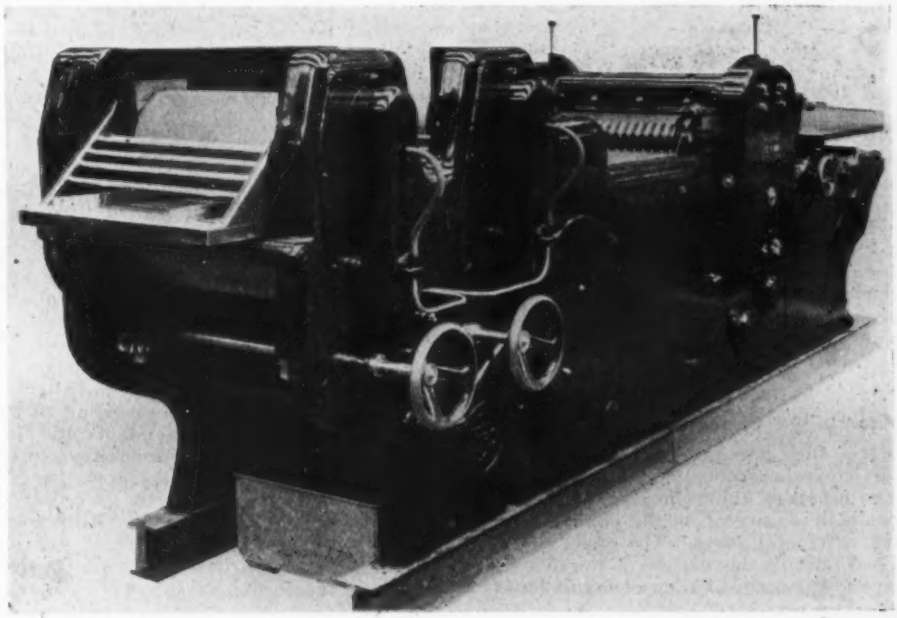
The zoning was introduced in June, and the main outline of the scheme necessitated the division of the country into four zones with a stipulation that, in general, retailers and wholesalers in a particular zone would not be able to receive supplies manufactured outside that zone. Arrangements were to be made to deal with bulk transfer from one zone to another if there were any deficiencies in production.

While accepting the efficacy of zoning from the point of view of national economy the public found that there was a disadvantage in that they were forced to accept certain goods which they would normally have rejected.

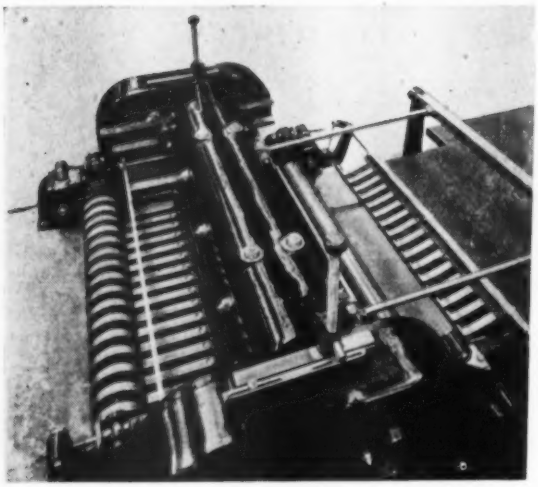
As only approximately 50 per cent. of the goods purchased in each zone had been manufactured there, it was obvious that the scheme must have resulted in a considerable saving in transportation.

Rationing

The relationship between the trade War-Time Associations and the Ministry of Food has remained on an extremely satisfactory basis. The working arrangement adopted throughout the year is still the same as



Continuous caramel and toffee cutting machine. *(Courtesy: Baker Perkins, Ltd.)*



Another view of the continuous cutting machine shown on page 43. *(Courtesy: Baker Perkins, Ltd.)*

that which was originally introduced. The general principle followed out has been for the Ministry to tell the industry what was wanted and leave them to carry it out. Great economies have been effected in the number of lines marketed by individual firms. The requirements of the scheme for the concentration of industry have resulted in the disappearance of products where mass production was not applicable. Any machinery which can maintain continuous flow of output is now in great demand. The illustrations show the latest type continuous caramel and toffee cutting machine. Toffee can be so lapped as to feed in a continuous sheet, which can be up to 18 inches wide. Once this has been placed on the feed table the machine does the rest, sizing the slabs to the required thickness, then cutting and feeding the pieces all accurately spaced direct on to the wire band of a 24-inch enrober. The Ministry have indicated their approval of the rationing schemes put forward by stating that very few proposals of an allied nature have been found so interesting or so comparatively simple.

Tangible proof of this point of view is provided when it is realised that the actual redemption of coupons has exceeded 90 per cent. of the total available for exchange. When it is remembered that the availability of the goods, as well as the desire of the public to purchase, is a determining factor the significance of such excellent results will be appreciated.

Vitaminised Chocolate

It is fairly general knowledge that the preparation of vitaminised chocolate on a large scale has commenced. The necessity for its introduction into this country is not quite so urgent as the possibilities of its use for the relief of Europe. The policy of the Ministry of Food towards this country is to rely as far as possible on the balanced selection of natural foods as a source of all the necessary vitamins. The problem is straightforward because it is possible to recommend a diet which will guard against any deficiency of this nature. It was considered, however, that it would be necessary to prepare vitamin concentrates for the relief of Europe because of the starved condition in which it is likely we shall find a great proportion of the liberated people. As this requirement will be especially necessary for young children, it was important that some palatable type of foodstuff acceptable to this group of the population should be selected as the basis of a vitamin concentrate.

As a result of investigation sponsored by the Ministry, it was ascertained that chocolate was the natural medium for incorporation of these essential constituents because the cocoa butter, present in the chocolate, proved to be a natural protective agent against the loss of potency which often occurred when vitamins were introduced into manufactured foodstuffs. As a result of this valuable work the manufacture of vitaminised chocolate is now in progress.

It is interesting to note that the War Office have been attracted by the possibilities of such a commodity forming a part of the emergency rations of troops on very special occasions and supplies have also been made available for this purpose.

Availability of Cocoa Butter

The national demands for the availability of cocoa powder resulted in a surplus of pressed cocoa butter being available for use. In view of the restriction in neutral fat allocations which is general throughout the industries engaged in the production of foodstuff, it was essential that every endeavour should be made to utilise this surplus in place of hydrogenated vegetable fats. As a result of experiments, a highly refined form of deodorised cocoa butter has been substituted for hydrogenated oils in the manufacture of sugar confectionery. It was considered that this was the most likely channel for the utilisation of the surplus because the proportion of fat required by such confectionery is relatively small, and also because when such goods are chocolate-coated it is difficult to detect the difference. The judicious employment of emulsifying agents to improve the texture of the confectionery has enabled this alteration to be made, and it has now been possible to discontinue the allocations of neutral fats to the sugar confectionery industry. It must, however, be remembered that the substitution of cocoa butter for dairy butter in lines which are sold to the public as butter toffees is not possible. The public have the right to expect that any line marketed under such a title should still contain its quota of dairy butter. In this particular case the butter is serving the additional purpose of providing the essential flavour to the confection, and this is a function which cannot be adequately fulfilled by cocoa butter.

It is perhaps interesting to record at this stage a trend which has taken place in the composition of chocolate. In previous years research was carried out which permitted the proportion of cocoa butter required to be reduced by the introduction of an agent which decreased the viscosity of the cocoa butter and thereby increased the fluidity of the chocolate. The chief benefit derived from this practice was a reduction in the costing of the article because cocoa butter represented the most expensive ingredient. Recently, another factor has had to be taken into consideration. Cocoa butter is one of the few surplus raw materials

available to the trade and, as a consequence, any increase in its use can result in additional output. It is now, therefore, to the advantage of the industry if extra cocoa butter is used. Thus, by reducing the portion of the agent added to decrease the viscosity, it is possible to balance the fluidity of the chocolate so that the recipe will absorb an extra quantity of fat without altering the physical properties. The chocolate must remain substantially the same in order that the methods of subsequent processing are carried out efficiently. Unfortunately, with price control a dominating factor, it is not always possible for the manufacturer to carry out this policy to such a definite conclusion. A compromise has in some cases been necessary.

Packaging and Wrapping

Definite limits have been set up to control the proportion of wrapping which is to be permitted for a unit quantity of confectionery. The proportion of immediate wrappings which were used in high boiled sugar confectionery lines was extremely high in normal times because it was necessary to increase the shelf life by the prevention of absorption of moisture, which causes stickiness. Now that the necessity for prolonged shelf life has been reduced to a considerable extent, such elaborate precautions are not quite so necessary, and the majority of high boiled sweets are marketed without this additional refinement. This has emphasised the care necessary in the production of boilings so that the water content is as low as is permissible without loss of colour or flavour. Certain manufacturers hitherto preferred to prepare this class of sweet, relying upon partial inversion of the sugar with an acid agent such as cream of tartar to retard the grain. This type of confection definitely required an immediate wrapping because of the greater affinity for moisture which this sweet possessed. There has, however, been a greater tendency to eliminate the possibility of graining by the utilisation of corn syrup, and this method does, of course, require less delicate control.

Reverting for a moment to the trend towards wrapping economy, in its relation to flour confectionery it is interesting to record that the use of moisture-proof transparent paper which was prepared by the application of a special moisture-resistant film is now no longer permitted for the wrapping of cakes. This presented a problem to the trade because the retention of the moisture in certain cakes is a very important factor in increasing what, under normal circumstances, may be termed a relatively short shelf life. Further, the restrictions on the quantity of certain raw materials in cakes as well as the quality of other essential constituents still available resulted in a more rapid deterioration in the capacity of the cake to retain its moisture. Consequently the need for moisture-proof wrapping was perhaps even greater than ever before. Fortunately, as a result of investigation by the trade concerned with the production of transparent paper, a wrapping has recently been introduced which embodies the same basic cellulose material, but instead of the moisture-proof film there is now an impregnation of wax which is applied by a special process. The resistant capacity of this paper to moisture penetration has been proved to compare very favourably with the material which it has replaced. On the other hand, the transparency is not quite so good, and the paper marks very easily when handled. It can, however, be classed as a most satisfactory substitute, and there is possibly a case for its retention even when the original moisture-proof transparent paper is again available for general trade use.

Flavouring

The position with regard to the supply of essential oils has been extremely difficult. Because the quantities concerned were so small compared with other raw materials it had not been found possible to exercise any definite control. Consequently, prices had advanced out of all proportion, particularly for the poorer quality of essential oils, and the supplies of the more desirable type from Mediterranean sources were not available. Manufacturers were, therefore, compelled to rely upon supplies conserved over a long period of time or to purchase inferior quality flavourings in an open market at a high price. In any case it was no use the Ministry of Food controlling the allocation of essential oils until they had reasonable quantities available to offer.

In recent months, however, a satisfactory scheme has been put into operation which caters for the requirements of the confectionery industry for most essential oils. This has caused considerable satisfaction because one of the outstanding results has been the great difference between the controlled price of the essential oil and that which operated on the open market prior to the introduction of the scheme. The only disadvantage so far encountered has been the impossibility of the supplier to guarantee a standard quality because he is only acting as the agent for the Ministry in passing the essential oils out to the industry.

Now that a successful scheme for distribution is well on the way it should be possible for the manufacturers to receive improved quality as shipping space becomes available for supplies from the Mediterranean zone. The flavouring of confectionery has become increasingly important because of the non-availability of certain raw materials with natural flavouring properties such as milk, nuts, etc., which were at one time used extensively. As goods tend to become more simple in composition the introduction of flavour becomes of outstanding importance, and it is well worth while every manufacturer concentrating his attention upon this aspect in order to give his goods just that little extra acceptability.

It should be remembered in this respect that acidity and flavour cannot be considered as two separate properties. The nature of any flavour can be seriously affected by variation in acidity. Care should be taken to ascertain by experiment the correct acidity required by each individual flavour in a type of line such as a boiling, where a basic recipe is employed and only alteration in flavouring agent introduced to achieve variety. It is suggested that specially selected acidity concentrations should be added according to the nature of the flavouring agent so that the two factors blend together and produce the most palatable result.

Scientific Control

Increased attention has been paid to the utilisation of science in industry. In this respect the confectionery

trade is no exception. One of the main functions of laboratories under normal conditions was the examination of all raw materials which were employed in manufacture. There is no doubt that by such control it was possible to obtain the finest quality material at the keenest price. Maintenance of standard attained from the buying sample selected for use could be insured by a comparative examination of each succeeding delivery. There was a tendency for science to play only a small part in ensuring that such raw materials were blended to the best possible advantage by control of processing. Recently, however, the variety of raw materials available has become extremely limited. Further, the majority of raw materials now come under Government control, and there is an obligation on the part of the manufacturer to accept the quality offered, provided the standard is sufficiently good for manufacturing purposes. Since also these materials are allocated at definite intervals and, therefore, arrive in larger bulk, all these circumstances combined to reduce the amount of routine testing required. The difficulties of the manufacturer have been increased by these factors because, where previously he was able to introduce individuality for his goods by incorporation of a well-chosen range of products, he now has to increase the quality above that of his competitors by technical improvement in processing, which will make the best possible use of different raw materials. Considerable assistance has been rendered by scientific departments in industrial concerns, and the manufacturer has probably come to realise the tremendous advantages of technical control in the processing as well as in the choice of materials which are being employed.

In order to assist in this problem the Ministry of Food have permitted corn syrup to be taken in place of a portion of the sugar on a weight for weight basis of the anhydrous product. That is to say, for every 82½ parts of sugar relinquished it has been possible to obtain 100 parts of corn syrup. This has proved an extremely useful asset because the presence of an increased proportion of corn syrup is necessary in several sugar confectionery lines to offset the shortage of invert sugar, which quite often was previously prepared by the manufacturer from cane sugar by a process involving the use of increased labour.

Blended Chocolate

The release by the Government of quantities of skimmed milk powder, both of the roller and spray variety, has been of considerable help. The natural outlet for such supplies has been the preparation of a form of milk chocolate. In view, however, of the fact that milk chocolate has always been prepared from some form of milk concentrate containing the whole of the milk-fat, it was considered that the sale of a product bearing the name of milk chocolate and prepared from skimmed milk solids would be somewhat misleading, although perhaps not definitely illegal. In the majority of cases the manufacturers have allowed for this by marketing the line as a blended chocolate, which more or less indicates a compromise between a plain and a full cream milk variety. There is no doubt that a big improvement has been effected by the release of this raw material, especially in the manufacture of this particular line and in the production of caramel goods.

Cries of Cambridge

[" Visions of a revolution in the food habits of the nation . . . for the last three years almost all the work at . . . Torry, Ditton and Cambridge has been devoted to dehydration. . . . Cabbage, storage time two years." —*Daily Telegraph.*]

" GIVE us of your copper,
Give us of your gold,
Buy our Cambridge cabbage
(Dehydrated cabbage),
Cabbage two years old!"
So the men of science
To the housewife cry,
" Quit the local market
(Stupid local market!),
Come to us and buy!"

Housewife, does your household spurn its cabbage with a frown?
Say it comes from Timbuctoo and they will wolf it down.
Cabbage from Alaska, cabbage from Turin,
Cabbage from Siberia, cabbage from Pekin,
Cabbage from Coolgardie, cabbage from Jodhpore—
But never from the little man who grows it round the door.

" Give us of your copper,
Give us of your gold,
Buy our Cambridge cabbage
(Dehydrated cabbage),
Cabbage two years old!"
So the men of Cambridge
And of Ditton cry,
With the men of Torry
(Where on earth is Torry?),
" Come to us and buy!"

Science still will have its say and middlemen their grab,
Take the British cabbage and consign it to the lab,
On a lorry into Torry (where is Torry?) green and gay,
Where you desiccate its noble leaves and squeeze its heart to hay
And pack it up in cellophane and label it complete
(Say at Ditton), and the Briton gets the residue to eat.

" Give us of your copper,
Give us of your gold,
Buy our Cambridge cabbage
(Dehydrated cabbage),
Cabbage two years old.
Meat is better mummied,
Milk is nicer dry,
But the pick is cabbage
(Dehydrated cabbage)
Come to us and buy!"

H. P. E.

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TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Milk Distribution

The first of a series of papers presented at the first conference of the Society of Dairy Technology.

P. PROCTOR, M.A. (Cantab.)

IN THIS paper it is proposed to treat trends and problems separately, and since my experience at the present time is most intimately connected with Birmingham my subject material will be concerned primarily with the milk distributive trade in that city and neighbouring towns. The type of milk distribution in this Midland area resembles that which prevails in the area extending from Birmingham to Manchester and Liverpool, except that the proportion of sterilised milk is much greater than in the last two cities; in fact the methods adopted in milk delivery in this area appear to be much more typical of the majority of towns than the type of delivery which is adopted in London and the south of England generally.

Everyone who is connected with the handling of milk in any way will be aware of the profound influences which are affecting and disturbing the milk distributive trade as a direct consequence of the war; many of the old problems have become much more serious in their incidence and new problems have arisen in unexpected ways. It may even be said that the influences of dairy bacteria have been affected by wartime conditions.

Trend of Milk Consumption

The first trend which I wish to discuss is connected with the amount of liquid milk which is being consumed by the public during present wartime conditions. It is general knowledge that the nation is drinking much more milk than in pre-war years, but it is not so easy to compare the pre-war rate of consumption with the wartime controlled rates. During the last ten years I have calculated from time to time the average quantity of milk delivered to each home or " call " for the dairy businesses under my management, and the quantities varied from 1·22 to 1·30 gallons per home per week or from 1·40 to 1·49 pints per home per day under pre-war or " early wartime " conditions. In the first table I have restricted myself to dealing with figures secured in Birmingham and commencing with June, 1940.

It is now well known that the principal object of the Milk Control Scheme of the Ministry of Food is to ensure that those members of the population who need milk most shall be ensured of adequate supplies from a nutritional point of view. In fact the Ministry of Food has adopted and extended the principle which had been initiated and practised in an experimental manner by the Milk Marketing Board in co-operation with the Commissioner for Special Areas (England and Wales) since 1936, in the Rhondda Valley, Jarrow, the Walker district of Newcastle-on-Tyne and Whitehaven. The effect of this plan has been to assure sufficient milk to children, nursing and expectant mothers and invalids at all times of the year, and to distribute the remaining milk to the remaining non-priority adults in quantities of either (A) 2 pints, (B) 2½ pints, (C) 3 pints, or even 4 pints, per non-priority adult per week, according to the season of the year and the relative volume of milk production.

Table 1 shows that the distribution of milk to the average home under heading (B) corresponds approximately with the amount of milk which was purchased during the early stages of the war, and that under headings (C), (D) and (E) the average home is enabled to purchase more milk than was bought before the control of retail milk was instituted. It must be acknowledged that this is a remarkable achievement, and that the Ministry of Food is entitled to much praise in consequence.

TABLE 1

TREND OF MILK CONSUMPTION IN THE AVERAGE HOME IN BIRMINGHAM.

(Supplied by one distributor only.)

	Gallons per Home per Week.	*Pints per Home per day.*
June, 1940	1·27	1·45
Oct., 1940*	1·32	1·50
April, 1941†	1·37	1·56
July, 1942†	1·42	1·63
Nov. 1942 Heading A‡	1·20	1·37
(Authorised in ,, B‡	1·36	1·55
M.K.2 certi- ,, C‡	1·51	1·73
ficate) ,, D‡	1·66	1·90
,, E‡	1·81	2·07

* Coincident with period of aerial bombardment.

† Variety of foods becoming restricted.

‡ A, B, C, D and E represent the rationing bases for milk for each non-priority customer at the rate of 2, 2½, 3, 3½ and 4 pints per week respectively.

" Milk Consumption Habits "

It is interesting to compare the figures of milk consumption given in Table 1 with the figures given by Murray and Rutherford in their study of "Milk Consumption Habits". These authors determined the average weekly consumption of liquid milk in households in sixteen scattered towns in England and Wales in May and June, 1938, and obtained an average figure of 3·41 pints per head per week. Since the average size of households in their survey was 3·43 persons, it follows that the total consumption of liquid milk per household was 1·46 gallons per week or 1·67 pints per day. This rate of consumption was much higher than the average pre-war sales of milk recorded in my figures, and it is likely that many of the householders

included in my survey then obtained supplies of milk from other dairymen.

It is well known that the West Midland urban areas form a nucleus of towns in which sterilised milk has been popular during the last 30 years. Inquiries show that the demand for sterilised milk has increased rapidly since 1939, and particularly since the operation of the Milk Control Scheme. The long keeping quality and economy of utilisation of sterilised milk are factors which have been responsible for many households, particularly in working-class districts, selecting sterilised milk instead of pasteurised milk through the impossibility of purchasing milk every day or of obtaining canned milk from the shops as in former years.

Producers and Dairymen

There is one unsatisfactory trend to which I attach great importance, and it is the reduced contact which now occurs between producers and dairymen. This trend commenced quite suddenly in the autumn of 1933 and was a direct consequence of the setting up of the Milk Marketing Scheme. It will be recalled that all producers were guaranteed a market for their milk, and consequently farmers made much less contact with the milk buyers from that time, both at the contract renewal periods and at other intermediate times. As a result of wartime conditions the Regional Milk Supply Officers have directed many farmers' dairies of milk to new purchasers in accordance with the Milk Marketing Board (Modification of Functions) Order, 1940, and this process is now being applied on a large scale in the allocation of "block areas of supply" in the endeavour to eliminate all waste of time and transport in the haulage of milk to the towns. This process is undoubtedly necessary to assist in the prosecution of the war; but it is resulting in farmers and dairymen not even knowing one another personally but only by names and numbers. The mutual understanding which more readily prevails when the personal parties in business are known to each other has been considerably reduced, and this factor has probably contributed substantially to the reduction of the bacteriological quality which has been developing slowly since 1933, and at a much more rapid rate since 1939.

Distribution Problems

In this section of the paper it is proposed to include a few problems which are related to the bacteriological aspect of milk handling, which in my view is more important at the present time than chemical quality, since now there are many households to which milk can only be supplied two or four times weekly when milk is only sold in the pint size of bottle, and in consequence the longest possible keeping quality is required.

I think it will be generally agreed that the best results are obtained when really clean milk is pasteurised very soon after milking. Under wartime conditions, however, the prepasteurisation period is becoming longer, and for the two chief following reasons. The first of these reasons is that many producers, which in some districts may amount to five or ten per cent. of the whole, withhold some of all of their morning milk until the following day owing to lateness of finishing milking. The other principal reason is that as a result of a combination of factors such as the difficulty of securing and controlling labour, wartime fatigue, the effects of "black-out" conditions, the operation of summer time, and particularly of double summer time, the milk is arriving at the town dairies at least two hours later than under pre-war conditions, and some loads may be three or four hours later. The belated arrival of the milk affects the organisation of work in some dairies severely, since there is a prolonged delay between the time when the last distribution rounds have been despatched on their journeys and the time when the first bottles are filled with milk.

Lack of Pasteurisability

The effect of the extension of the prepasteurisation period appears to be highly favourable to the development of thermoduric bacteria. I do not propose to deal with the subject of mechanical milking appliances in this connection, except that the failure of many farmers to maintain them in a satisfactory state of cleanliness has resulted in a substantial increase of thermoduric bacteria. The initial presence of numerous thermoduric bacteria results in large numbers of thermoduric organisms remaining alive in milk immediately after pasteurisation carried out in accordance with the Milk

TABLE 2

Laboratory Pasteurisation at 145° to 146° F. for 30 Minutes.		*Laboratory Sterilisation at 223° F. for 20 Minutes.*		*Residual Coliform Bacteria.*	
Bacteria Counts.	*No. of Samples.*	*Bacteria Counts.*	*No. of Samples.*	*Heat-resistant Coliform Bacteria Present Immediately after Pasteurisation.*	*No. of Samples.*
Up to 10,000	598	Up to 100	530	In 1·0 ml.	27
10,001–50,000	31	101–1,000	95	,, 0·1 ,,	34
50,001–100,000	19	1,001–30,000	38	,, 0·01 ,,	—
Over 100,000	51	30,001 and over	36	,, 0·001 ,,	—
	699		699		61

N.B.—All samples taken from morning milk whenever possible, and were tested within half an hour of heat treatment.

(Special Designations) Orders 1936/41. Although thermoduric bacteria may not be very active in reducing the keeping qualities of milk, the presence of excessive numbers may result in representations by the Public Health Authorities. I refer to this phenomenon as "lack of pasteurisability", and it is unfortunate that the policy of the Ministry of Food of assembling milk in bulk in country creameries and transporting it in tanks to distant urban destinations is favourable through the time factor to the development of thermoduric bacteria. Many instances are known of the counts of thermoduric bacteria being in excess of the maximum count permitted for pasteurised milk immediately after both laboratory pasteurisation and commercial pasteurisation under conditions where post-pasteurisation contamination was not a factor.

Whereas many thermoduric bacteria may not be a potent factor in reducing the keeping quality of pasteurised milk the position is much more serious in connection with sterilised milk. Many of these thermoduric organisms can survive sterilisation at 220° to 225° F. for twenty minutes, and it has been found that the inferior hygienic quality of raw milk has already had a profound effect upon the keeping qualities of sterilised milk. The position has been so disturbing that a survey was carried out at the dairy with which I am connected in which 699 samples of milk were tested for bacteria count:

(*a*) After laboratory pasteurisation at 145° to 146° F. for 30 minutes;
(*b*) Half an hour after laboratory sterilisation at 223° F. for 20 minutes; and also
(*c*) For heat-resistant coliform bacteria after laboratory pasteurisation.

The results are tabulated in Table 2.

Examination of Table 2 shows that results are already very unsatisfactory, and it is to be hoped that the milk from farms will be radically improved in the immediate future as a consequence of the operation of the new National Milk Testing and Advisory Scheme organised by the Ministry of Agriculture and Fisheries. During the survey of the 699 samples of farm milk, which were produced in seven West Midland Counties and may be regarded as a typical cross-section of the milk produced in that area, there was an outbreak of heat-resistant coliform bacteria which were not destroyed by laboratory or commercial pasteurisation at 145° to 146° F. for 30 minutes. The outbreak occurred in the late autumn of 1942 and died away with the cooler conditions of winter, but it has appeared spasmodically during recent months. It is customary for dairy bacteriologists to assume that post-pasteurisation contamination has usually occurred where coliform bacteria are present in the pasteurised milk, but it is evident that there will have to be a revision of this point of view if there are further outbreaks of heat-resistant coliform bacteria. It appears that even the characteristics of bacteria may be modified as a consequence of wartime conditions.

The Resazurin Test

As is already well known, the resazurin test has been developed for testing milk during the last three or four years, and it has been adopted in a provisional manner as the official test under the National Milk Testing and Advisory Scheme. Experience in the provinces indicates at this stage that the "10-minute resazurin rejection test" as well as the standard "routine resazurin test" are giving very satisfactory and encouraging results. It seems evident, however, that an improvement in the national milk supply can only be obtained if the advisory officers are able to utilise the laboratory results at the actual farms. If advisory officers can succeed in eliminating faulty and slipshod methods on the farms there seems little doubt but that the new scheme will be very successful in improving the milk supplies of the country and in eliminating considerable waste and sourage. It will be agreed that most of the faults on farms occur through insufficient cleanliness of milk production, inefficient cleansing of dairy utensils, and insufficient cooling of milk immediately after milking.

As a matter of interest the results of the resazurin test on 699 raw milk samples were compared with the counts of bacteria determined half an hour after laboratory pasteurisation at 145° to 146° F. The results are tabulated in Table 3, which shows that the bacteria counts of 51 of the 699 samples exceeded 100,000 per ml., and so failed to pass the standard laid down in the Milk (Special Designations) Order 1936 for pasteurised milk immediately after pasteurisation had been carried

(*Continued on page 63*)

TABLE 3.

RELATIONSHIP OF RAW MILK RESAZURIN READINGS WITH RESIDUAL BACTERIAL COUNTS AFTER LABORATORY PASTEURISATION.

After Laboratory Pasteurisation (30 mins. at 145° to 146° F.)	*Number of Raw Milk Samples with Resazurin Disc Readings of:*							
Bacteria per ml.:	0	½–1	1½–2	2½–3	3½–4	4½–5	5½–6	*Total.*
Up to 10,000	32	9	44	33	92	244	144	598
10,001–50,000 ...	5	2	2	3	4	11	4	31
50,001–100,000 ...	3	—	3	—	2	9	9	19
100,000 and over ...	8	2	2	6	6	11	16	51
								699

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, January 1, page 10.

No.	*Date.* 1943.	PRICE FIXATION ORDERS
1292	Sept. 6.	Amending the Fish (Maximum Prices) Order 1943.
1303	,, 8.	Dried Fruits (Control and Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 112, 257,* 471 and 645.*
1307	,, 9.	Amending the Potatoes (1943 Crop) (Control and Prices) Order, 1943.
1314	,, 15.	Imported Frozen Eggs (Maximum Prices) Order. Revokes S.R. & O. 1940 No. 417 and 1941 No. 7.
1324	,, 13.	Egg Products (Control and Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 796, 1021, 1651, 2076 and 2310; and 1943 No. 874.
1340	,, 15.	Amending the Carrots (1943 Crop) (Control and Prices) Order, 1943.
1346	,, 18.	Amending the Canned Fish (Maximum Prices) Order, 1943.
1361	,, 22.	Amending the Pickles and Sauces (Control and Maximum Prices) Order, 1942, and the Food (Sector Scheme) Directions, 1942.
1393	,, 24.	Potatoes (1943 Crop) (Control and Prices) (No. 2) Order. Revokes S.R. & O. 1943 Nos. 652, 835, 983, 1086 and 1307.
1306	,, 25.	Condensed Milk (Control and Maximum Prices) Order. Revokes S.R. & O. 1940 Nos. 957, 1621, 1622, 1788 and 1895; and 1942 No. 2186 (part only).
1410	,, 28.	Green Vegetables (Maximum Prices) Order. Revokes S.R. & O. 1942 No. 2664; and 1943 Nos. 633 and 1198.
1421	,, 29.	Pearl Barley (Control and Maximum Prices) (No. 2) Order. Revokes S.R. & O. 1943 No. 181.
1432	,, 30.	Home-Grown Apples (Maximum Prices) Order. Revokes S.R. & O. 1943 No. 1057.
1450	Oct. 6.	Cereal Breakfast Foods (Control and Maximum Prices) Order. Revokes S.R. & O. 1941 No. 1620; 1942 Nos. 2014 and 2231; and 1943 Nos. 361 and 865.
1465	,, 12.	Fish (Maximum Prices) (No. 2) Order. Revokes S.R. & O. 1943 Nos. 497, 558, 820 and 1292.
1477	,, 13.	Imported Canned Meat (Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 1014 and 2328.
1483	,, 16.	Imported Apples (Maximum Prices) Order. Revokes S.R. & O. 1941 No. 1636.

* Only in so far as they relate to dried fruits.

No.	*Date.* 1943.	PRICE FIXATION ORDERS
1497	Oct. 22.	Feeding Stuffs (Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 1669, 2127 and 2549; and 1943 Nos. 653, 981 and 1155.
1505	,, 20.	Rice (Control and Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 947, 1276 and 2571.
1506	,, 20.	Pulse (Control and Prices) Order. Revokes S.R. & O. 1941 No. 2139; and 1942 Nos. 1495 and 2461.
1517	,, 22.	Order, amending the Home Grown Tomatoes (Control and Maximum Prices) Order, 1943.
1526	,, 26.	Carrots (1943 Crop) (Control and Prices) (No. 2) Order. Revokes S.R. & O. 1943 Nos. 831, 1224 and 1340.
		BREAD BOARDS
1452	Oct. 6.	Bread Boards (Restriction on Use) Order.
		FISH
1604	Nov. 13.	Fish (Supplies to Catering Establishments) Order. Revokes S.R. & O. 1942 No. 2538 and 1943 No. 67.
		OILS AND FATS
1451	Oct. 6.	Order, amending the Edible Oils and Fats (Control of Sales) Order, 1943.
		POINTS RATIONING
1482	Oct. 15.	Order, amending the Food (Points Rationing) (No. 3) Order, 1943.
		POTATOES
1420	Sept. 29.	Order, amending the Potatoes (1943 Crop) (Control and Prices) (No. 2) Order, 1943.
1463	Oct. 9.	Potatoes (Restriction on Sales) Order.
1531	,, 26.	Potatoes (1943 Crop) (Charges) Order. [Emergency Powers (Defence) Act, 1939, S2.]
		RATIONING
1573	Nov. 3.	Order, amending the Food Rationing (General Provisions) Order, 1943.
1597	,, 10.	Sugar and Provisions (Rationing) Order. Revokes S.R. & O. 1943 No. 1003* and 1262.
		RESTAURANTS
1485	Oct. 16.	Directions, under the Meals in Establishments Order, 1942. (Turkeys.)

* In so far as it relates to sugar.

The Baking Industry

PROGRESS IN 1943

J. STEWART
National Bakery School.

IT IS very likely that 1944 will bring with it as many problems for bakers and confectioners as the past year has done, but with it comes nearer the time when we hope all those difficulties and problems that have beset us will be over, and there will be a measure of freedom from so many controls.

We started in 1943 with the Cake and Flour Confectionery Order, wondering how it was going to be observed, and also with the prospect of many changes being made in our basic raw material—flour—because of the abundant supplies of home-grown wheat and other cereals, and the shortage of shipping space to supply imported strong wheats for flour. We had not long to wait before the flour changed in character owing to the admixture of such cereals as barley, rye or oats into the millers' grist, with an increased proportion of English-grown wheats. The flour produced was much softer in character, and had not the fermentation tolerance of the National Flour of 1942. The Manitoban wheat content of the flour was much less than formerly, but the flour produced had quite a good moisture-absorbing capacity, taking 15½ to 16 gals. water per sack for tin bread. The technical advisers of the Ministry of Food issued instructions to bakers regarding the use of 5 lbs. salt per sack of flour as a minimum in all doughs, in order to provide a greater fermentation tolerance. Bakers were also advised that a three-hour bulk fermentation was most suitable for the new type of flour. Many bakers managed to produce good bread with this flour in longer processes, but great care had to be taken to avoid over-proving. Generally the bread produced was of smaller volume than formerly.

Use of Bread Improvers

Various bread improvers were used to give better fermentation tolerance and better volume to the bread. Soya flour was one that gave good results; 5 lbs. or more per sack of flour effects a good improvement in the volume and eating qualities of the bread.

Another improver that gives excellent results is lecithin, when used in the form of an emulsion. A new form of lecithin has been introduced which is easily made into an emulsion with water. It is a 40 per cent. lecithin from groundnuts. It requires 1 part lecithin with 2 parts warm water (120° F.), beaten together with a whisk to make the lecithin emulsion. 5 lbs. of this emulsion per sack of flour into bread dough does not affect the dough time, but gives a greater fermentation tolerance to the flour and a big increase in loaf volume without affecting the crumb structure of the loaf. It helps in the making of soft moist-eating bread of excellent volume when used in the quantities stated or more if desired.

These improvers have the added advantage that they add to the food value of the bread besides making it more palatable.

Baking of National Flour

With the introduction of up to 10 per cent. barley and/or rye into National Flour and a small proportion of milk powder, it was found that the flour carried extra water in the doughs, because barley and milk powder carries more water, weight for weight, than wheat, and when mixed with the softer wheats it assisted them to carry a full water absorption. 15½ to 16 gals. water per sack can easily be used in tin bread doughs.

To obtain best results from the flour the following recipe was recommended by the Ministry of Food. A three-hour dough process proving universally satisfactory was also recommended.

280 lbs. flour.
5 lbs. salt.
2½ lbs. yeast.
15½ to 16 gals. water.
Temperature of dough, 78° to 80° F.
Dough time, 3 hours.

2¾ lbs. yeast may be found necessary on automatic plants.

3¼ hours in the dough may be necessary in some places, depending on the condition of the bakery, while for hand scaling 2¾ hours might be sufficient.

It is always essential to have a lively fermentation, using sufficient yeast to ferment the dough thoroughly if bread with good eating and keeping qualities is to be regularly produced. Rapid recovery after scaling is essential if normal volume is to be obtained.

To produce the best results from National Flour, bakers should check up on the following points:

1. Water absorption—to obtain maximum extensibility in the doughs.
2. Yeast content—should be sufficient to mature doughs and provide adequate gas production during proving stage.
3. Correct salt content—since salt acts as a valuable stabiliser and assists flavour and moisture retention in the finished bread.
4. Dough temperature—correct temperature means correct fermentation and good quality bread.

Bread should be moist, palatable and attractive. It is only by attention to the above points that satisfactory and consistently good results are assured.

Uses of National Flour from Home-Grown Wheat

Owing to the record harvest of 1943, home-grown grain comprises about 60 per cent. of the grist used at the present time for National Flour, while the percentage of barley, rye or oats has recently been reduced from 7½ to 2½ per cent. of these diluents. While the latest sample of this flour contains less diluents, it is surprisingly good, and still carries 15½ to 16 gals. water per sack for tin bread doughs, and there is little apparent difference in the volume of the bread ob-

tained from it. More care has to be taken with the fermentation, and it must not get too much proof. The doughs prove slightly more quickly than formerly.

An all-English wheat flour is now also being produced specially for confectioners, and they have been asked to make sure that at least 50 per cent. of the flour used in confectionery is this new flour from 100 per cent. home-grown grain or all-English flour. This flour should be specially suitable for cakes, sponge products, and short pastries, as well as for biscuits. It can also be used with 50 per cent. National Flour as a blend in making chemically aerated goods, but it is not suitable for the making of fermented small goods, where National Flour only should be used.

Egg Substitute Powders

After consultation between the Ministry of Food and the Food Manufacturers Federation, manufacturers of what were known as "Egg Substitute Powders" agreed to abandon this description and call them "Golden Raising Powders". This step was taken in order to avoid confusion between egg substitute powders, which, although valuable as aerating agents, had little nutritional value, and dried egg which is distributed by the Ministry of Food, and has the nutritional qualities of shell eggs.

The licences under the Food Substitutes (Control) Order, 1941, were withdrawn, and new licences under the Manufactured and Prepared Foods (Control) Order, 1942, were granted for the manufacture of all those products which have a satisfactory aerating value, on condition they are described as "Golden Raising Powders". The abundant supply of dried egg available to confectioners made the use of such egg substitute powders an expensive luxury—really unnecessary in any bakery. This was one means by which confectioners could produce better types of cakes.

The Flour and the Bread Orders

Two new Orders—the Flour Order and the Bread Order—were issued by the Ministry of Food during January, 1943, and about the same time instructions were issued to use more potatoes and less flour in confectionery, with a hint that bread rationing might become necessary, while there was need for further economies in retail delivery, and the wholesale delivery scheme became operative throughout the country. At the same time the problem of man and woman power became intensified. When it is remembered that these new and intensified problems came upon the bakery trade while they were still trying to adapt themselves to the Cake and Flour Confectionery Order, it must be admitted that January, 1943, was a very worrying month for bakers.

The new Flour Order, while revoking seven previous Orders and combining them within itself, added other provisions; but the main one affecting bakers made it necessary for every baker who makes his own self-raising flour to possess a licence to do so.

In the new Bread Order all the previous Bread Orders were combined. This consolidation nearly caused confusion, and an amendment to the original Order had to be issued to clear up matters. It affected the manufacture, except under licence, of more than one-piece loaves. The word "one-piece" was deleted from the definition of tin loaves, and for some obscure reason it was deleted from the clause referring to oven bottom bread. Had the Order not been amended it would have meant that bakers would have been able to revert to the manufacture of many types of fancy bread such as cottage loaves, etc. It also prohibited the making of bread in England with more than 12½ per cent. white flour in National Bread, and in Scotland 25 per cent. white flour was still allowed.

The new Bread Order, while giving bakers more latitude regarding shapes of bread, made it easier owing to the shortage of labour to produce only one or two shapes of bread in alternate weeks. This Order also required bakers to keep various records showing stocks of flour, quantity of flour bought and sold each week, quantity of bread produced and flour used in the production thereof, quantity of bread sold each week, and the names and addresses of retailers supplied. It meant that bakers had to keep their books in a business-like manner, and, while it meant more clerical work, it was a good thing for the uplifting and progress of the trade. During the closing stages of the year another consolidating Bread Order came into force which in the main continued the previous Orders, but gave the Ministry of Food a still closer grip of the baking industry.

Potatoes in Confectionery

A big drive among bakers by the Ministry of Food was launched early in 1943 with a view to making popular the use of potatoes in flour confectionery. Various displays of about 75 varieties of flour confectionery in which a considerable proportion of potatoes had been used were sponsored by the Ministry of Food. Goods exhibited were drawn from leading bakeries in England, Scotland and Ireland. It was mainly an appeal to confectioners to save flour and shipping space by using the large surplus of potatoes that was available. Lecturers were also coached and sent out to give instruction on this subject. The displays and lectures and demonstrations had a certain educative value, and were so well received by the trade that the surplus of potatoes was soon exhausted.

The introduction of potatoes into flour confectionery to save flour was a means of making an improved variety of confectionery with the rationed materials available. Better cakes and sponge products could be produced with the addition of potatoes, since these had a softening value in these goods and helped to make them more appetising and moist eating. New methods of making sponge products were introduced with dried eggs, which was a vast improvement on the previous methods used.

The greatest difficulty confectioners had was in finding the labour necessary to prepare the potatoes. Willing, as many were, to use as many potatoes as possible, they could not get their staffs to prepare the potatoes in large quantities. Some solved this problem by appealing to their housewife customers to come in and help them with part-time labour on this work. One baker had about six women come in for a few hours each day and prepare the potatoes, so that he could use as many as he required. It was the ideal way of getting over this difficulty.

The large surplus of potatoes in the early part of the year was soon used up, but the same problem is with us again with the abundant supply of potatoes available at present, and confectioners would be well

advised to make the best use of them. A booklet—*The Use of Potatoes in Flour Confectionery*—issued by the Ministry of Food to all bakers in May, 1943, gives excellent advice on their manifold uses in baking and many dependable recipes. Those who have not studied this booklet and who are not making full use of the recipes are not sufficiently progressive, because it does show how potatoes can be used with profit to the baker. Many more confectioners might have been keener to use potatoes in their confectionery if they had realised how they can be used to extend the fat ration, especially in short pastries and cakes.

Cake and Flour Confectionery Order, 1943

The Ministry of Food made a new Order relating to Cake and Flour Confectionery, which came into force during May, 1943. The main effect of this new Order was to abolish the addition of edible substances to cakes and other types of confectionery after baking, with exceptions in the case of Swiss rolls and sponge sandwiches, where one edible substance only may be added after baking these goods. This eliminated all the decoration of cakes after baking and simplified the production of confectionery. All the labour required for the decoration of cakes could now be used in making more of other types of flour confectionery, and the materials formerly used to decorate the cakes be used to produce more cakes. Furthermore, the delivery of cakes, etc., to households was limited to three per week.

The maximum retail price of 1s. per lb. remained, except where it could be proved that the cost per lb. exceeded 4d.; then the confectioner could charge three times the cost price, but in no case could the maximum selling price exceed 1s. 6d. per lb. Another Cake and Flour Confectionery Order has been expected to restrict further the price of cakes, but up to the time of writing this Order has not been published.

Malt Products as Sugar Extenders

Confectioners have been trying different methods of using malt products as sugar extenders in cake-making. Malt extract can be used to replace up to 25 per cent. sugar in cakes by simply reducing the sugar content of the cakes by 25 per cent. and replacing it with an equal weight of malt extract of low diastatic value, but this darkens the crumb of the cakes considerably, and is rather an expensive way of using malt extract, since it costs considerably more than sugar. By the following method 25 per cent. of the sugar can still be saved: A malt extract solution is prepared by mixing 1½ parts extract in 2½ parts hot water until thoroughly dissolved. When using this solution the sugar should be reduced by 25 per cent. and the milk by the same weight. Malt extract solution to the extent of twice the weight of the sugar left out is added. This makes quite good quality cakes, which keep moist, although the crumb is slightly darker than usual, and there is a slight loss of volume.

Some confectioners are now making a sweetening agent by the diastatic action of malt on gelatinised flour or on potatoes. There are various methods of doing this, which are quite successful. The maltose syrup produced contains at least 10 per cent. sugars, and can be used to replace the milk in aerated goods, while also saving part of the sugar. For each gallon of milk normally used the sugar content of the aerated goods or cakes is reduced by 1 lb. and 11 lbs. of the maltose syrup is used.

The method of making potato maltose syrup is as follows:

8 lbs. mashed potatoes. 2 gals. boiling water.	8 ozs. H.D. malt extract, or 1 lb. malt flour.

Boiling water is poured over the mashed potatoes and the mixture is allowed to cool to about 160° F. The malt extract or malt flour is then added. The temperature is maintained for 3 hours at least by covering the tub with sacks and keeping in a warm place. The mixture is kept covered for at least 12 hours until it is cool; it is then used as indicated above.

Use of Lard in Cake-Making

Compound fat has been unobtainable for some time now, lard being issued in place of it, and part of the cake-margarine ration has had to be taken in lard. This forced confectioners to investigate methods of getting the best results from lard, since it is not a good creaming fat. To improve the creaming qualities of lard, it requires to be melted below 110° F., and to be cooled quickly by stirring while adding ¼ lb. flour per lb. of lard, allowance being made for the flour in the cake batters at the creaming stage. The processed lard, flour and sugar requires only five minutes' creaming before adding the eggs. The eggs require to be creamed in slowly, and care taken not to overbeat them. Finally, to make sure the cakes are light enough, the baking powder should be increased by ½ oz. per 5 lbs. flour.

Recipe for Ginger Cakes using Melted Lard

1 lb. lard. 1 lb. brown sugar. 2 lbs. golden syrup. 1¾ pints water.	Melt the lard in a pan, add sugar and syrup, then mix in the water. The temperature of this mixture should not exceed 110° F. Allow to cool.
½ pint liquid egg.	Add to the above mixture.
3½ lbs. flour. 1 oz. mixed spice. 1 oz. ground ginger. 1 oz. soda bicarb. 1 oz. baking powder.	Sieve all these dry ingredients together, add to the mixture and clear well. Scale off into 1-lb. bread tins. Bake in a cool oven about 350° F.

This method of preparing cake batter, although rather unorthodox, produces very soft and moist eating cakes, which retain their softness and appearance exceptionally well.

Christmas Puddings

A new Order controlling the manufacture of Christmas puddings was introduced in September, 1943. This Order provided for a minimum sugar content in the puddings of 36 per cent., including sugars in vine fruits, and a minimum fat content of 10 per cent. This meant using at least 40 per cent. dried fruits, 12½ per cent. sugar, and 10 per cent. fat in the pudding mixtures. The maximum charges for the puddings were also given with the restriction on the weight of the puddings. 1 lb. puddings in non-returnable container had to be sold at 2s., and 1 lb. puddings in any other con-

tainers at 1s. 9d. 2 lb. puddings in non-returnable containers at 3s. 7d., or if sold in any other container the selling price was 3s. 4d. In effect, this meant that manufacturers of Christmas puddings had to make good-quality puddings to comply with the Order, and they could not charge an excessive price for them. In fact, the profit obtainable on them hardly made it worth while making these puddings, with the result that many of the usual manufacturers kept their fruit and sugar for other purposes this season. Since the puddings were limited in weight to 1 and 2 lb. sizes there was a freer distribution of those made.

Using Jam to Replace Sugar

Since the new Confectionery Order was introduced prohibiting the addition of anything to cakes after baking, confectioners have found that their jam ration could not all be used in sandwiching the permitted Swiss rolls and sandwiches, so they have used some of it in the making of cakes to save the sugar. It can be used to save up to 33 per cent. of the sugar in the cakes by reducing the sugar by 33 per cent. and the milk by 15 per cent. For each lb. of jam used the sugar is reduced by 11 ozs. and the milk by 5 ozs. No other alterations are necessary in the recipes. Jam will give a rich fruity flavour to the cakes. The following is a recipe for farmhouse cakes, where the jam not only saves some sugar, but is used in sufficient quantity to flavour the cakes:

1 lb. fat.
2 lbs. sugar.
2 lbs. jam.
1 oz. salt.
$4\frac{3}{4}$ lbs. wheatmeal flour.
3 ozs. baking powder.
$\frac{1}{2}$ pint liquid egg.
$2\frac{1}{2}$ lbs. milk.
2 lbs. fruit.

This mixing is made by creaming the fat, sugar and jam together, then creaming in the eggs. The remainder of the ingredients are then added and well cleared. The cakes are baked in large cottage pans in a cool oven at about 360° F.

The cakes produced should be soft and moist eating, with an excellent appearance.

Conserving Labour in the Bakery

Many bakeries are very short of labour, and ways and means of conserving labour and increasing production as much as possible have had to be thought out. Production has been speeded up by making the fullest possible use of the available machinery, and reducing the mixing times as far as possible. Some confectioners have given up creaming their cake batters, and are now using the all-in method, by simply placing all the dry ingredients in the cake machines and mixing on slow speed until fine and crumbly, then adding all the liquid ingredients on slow speed and continuing the mixing until the batters are clear. This method results in a loss of volume but a big increase of output.

These are only a few of the changes and a little of the progress that has occurred in the baking trade during the past year. As indicated, there have been both changes in methods and changes in quality and types of ingredients used. The quality of confectionery generally has depreciated, owing to the ever-increasing demand for more from the same low quantity of rationed materials available.

Controlled Relief in Europe

THE CAMPAIGN for supplying controlled medical relief to enemy-occupied countries was carried a stage further on January 3, when an influential deputation from the provinces was received by the Earl of Selborne, Minister of Economic Warfare. The deputation reported back to a conference in the Caxton Hall, Westminster, attended by more than a hundred delegates representing local committees of the Famine Relief Committee and other organisations from all parts of Great Britain.

Mr. Hugh Lyon, Headmaster of Rugby, who reported to the conference on the deputation, which was led by the Bishop of Wakefield, said that the Earl of Selborne had explained that an exception had been made of Greece because the Germans had been prepared to let all the Greeks starve, and the British Government hoped to increase the amount of food permitted through the blockade to that country in the near future.

He admitted that the situation was very bad indeed in Belgium, but took the view that any food sent to Belgium was practically giving lease-lend to Germany; that it might benefit a few but would not be enough to do any real material good without a serious breach of the blockade.

Mr. Hugh Lyon further reported Lord Selborne as saying that food was being sent to Russia, and more was being accumulated to send to countries as soon as they were freed. The Minister showed that in some respects the Government were doing more than they could reveal to the public.

Mr. Martin Parr, Chairman of the Executive of the Famine Relief Committee, who presided at the Conference in the absence of Dr. Gilbert Murray, after hearing the report of the deputation, said he was more convinced than ever that the Famine Relief Committee and its supporters should hammer away at Members of Parliament and the British public for something to be done. The Minister had used the same old arguments against relief that they could tear to tatters.

Vinegar from Milk

STATED to be the only one of its kind in existence, the factory of the Consolidated Products Company in the Ozark country at Nixa, Mo., is manufacturing vinegar from cheese whey, which was formerly wasted.

The by-product of a by-product of a by-product is used to produce a white, still, 100-grain of the type commonly used in preserving foods. The first by-product is cheese whey, which, fermented, produced a stock feed concentrate. From the residue of that process they found a low-alcohol by-product which they could distil and convert into vinegar.

Briefly, the cheese whey was first of all made into a high-vitamin, high-protein feed by fermenting a large proportion of the sugar (which amounts to 60 per cent.) of the cheese whey. A by-product of the fermentation process was an alcohol product which could be concentrated. The amount of alcohol, however, was not sufficient to interest the Government in an alcohol plant and a method of converting the alcohol into an industrial vinegar was developed.—*The Canner.*

Colour in Food

The ethics of the whole practice of colouring foods is challenged by the author of this paper, delivered before the Hull section of the Oil and Colour Chemists' Association. The case he advances against food colouring is twofold. First, some colours are harmful and the innocuousness of others rests on no better evidence than that they appear not to harm laboratory animals. Second, even if a colour is harmless it is used to conceal a defect in the foods quality or processing. Sometimes this defect is gross—when, for example, a yellow dye is used to imply that a powder contains eggs. In other cases it merely conceals the fact that the product has suffered decolouration in processing. But in any case, argues the author, the colour is meant to deceive, and deception is the essence of adulteration.

This paper is followed by comments by another public analyst, Mr. Thomas McLachlan, who agrees, with a few exceptions, with the author's general contentions.

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IN 1816 legislation was passed enacting that "No druggist, vendor of, or dealer in drugs, or chemist or other person, shall sell, or deliver to any licensed brewer any liquor called by the name of, or sold as colouring, from whatsoever material the same may be made; or any material or preparation other than unground brown malt for darkening the colour of worts, or beer, or any liquor or preparation made use of for darkening the colour of worts or beer, or any molasses, honey, vitriol, quassia, cocculus indicus, grains of paradise, guinea pepper, or opium . . . such liquor, preparation, molasses, etc., shall be forfeited . . . and the person so offending shall for every offence forfeit five hundred pounds."

The heavy penalty of £500 imposed for merely selling colouring agents for the darkening of beer is worth noting, for, under the Food and Drugs Act, 1938, the maximum penalty for the first conviction, however serious the offence, is a mere £20. Our forbears certainly believed in making the punishment fit the crime, for we read that in 1481 it was directed that a funnel should be placed in the mouth of any man or woman convicted of having sold watered milk and the said watered milk shall be poured down the funnel until such time as a physician shall declare that the culprit cannot be made to swallow any more without danger of death. If similar measures were introduced today the modern food faker might be deterred from gulling the public.

I have divided my comments on the colouring of food under three headings: First, How?; second, Why?; and third, What?

How is food coloured? Food may be coloured by metallic salts such as copper sulphate, by natural colouring matters such as cochineal or annatto, or by artificial dyes, and in some cases food may be coloured by the particular methods of processing such as smoking, curing or pickling.

The Fatal Green Blancmange

The practice of adding inorganic salts as colouring agents to food has practically ceased, although one or two countries, I believe, still permit the addition of limited amounts of copper salts for regreening canned vegetables. The departmental committee appointed by the Ministry of Health in 1924 reported that it had no hesitation in asserting that the addition of copper salts to food is highly undesirable and in this country such addition is now prohibited. In 1860 the over-zealous caterer at a public dinner created a beautiful green blancmange with the aid of copper arsenite, with the result that six persons were poisoned, some fatally. In 1917 0·56% of lead chromate was used as a colouring agent in egg powder, whilst as recently as 1938 a sample of turmeric root contained 282 parts of lead per million owing to the presence of lead chromate as a colouring agent. Such cases as these are fortunately rare.

Some Vegetable Colours may be Harmful

Natural colouring matters, such as annatto, saffron, chlorophyll, turmeric, cochineal and caramel, are also not now employed to any great extent, although annatto is used for the colouring of butter. Cochineal is still employed by the housewife, and caramel is added by the manufacturer to artificial vinegar so that it may resemble in appearance genuine malt vinegar. Not all vegetable colouring matters are harmless, as is sometimes believed. Gamboge, for instance, is a drastic purgative and its use is prohibited.

Attractive colours may be imparted to certain types of food by such processes as smoking or pickling. The common kipper and the smoked haddock possess a pleasing yellowish-brown colour which is normally produced by the smoking process, although the colour may nowadays be produced either wholly or partially by dyes in order to simulate the genuine smoked product. The reddish colour of ham is imparted by the action of nitrites in the pickling bath on the blood in the meat and is therefore another instance of the colouring of food by processing.

But by far the most widespread method of colouring

ood is the addition of artificial dyes, and the total quantity of artificially coloured food which is consumed per annum must be enormous.

Restoring Colour Lost in Processing

We pass on to our second heading. Why? Why are foods coloured? There appear to be at least two answers to this question: (*a*) to replace colour lost during processing and (*b*) to imitate an article of superior quality.

Canning entails, in certain instances, the partial loss of the natural colouring of the food, and this deficiency is often made good by the addition of colouring matter. Thus, copper sulphate may be used in some countries and dyes in others to impart a green colour to canned runner beans, spinach, peas or sprouts, whilst strawberries, raspberries and cherries may be dyed red. These are instances of the replacement of natural colours lost during processing. Yet if the fruit or vegetables are freshly gathered and are carefully processed the loss of colour is reduced to a minimum and recolouring may be unnecessary.

A new canning process has been evolved in America which protects the natural greenness of peas during canning so well that the canned peas are actually greener than fresh-cooked peas often are. Acidity destroys the green colour and an alkali is therefore added to preserve the greenness from destruction by heat. Formerly sodium bicarbonate, disodium phosphate and similar reagents were used, but these rendered the canned product "mushy" in texture, owing to extraction of the natural organically combined calcium and magnesium compounds which cement the walls of the plant cells together. If, however, lime water is used instead, the peas largely retain their greenness and are actually much harder than the conventional product. Therefore, the new canning procedure comprises three successive steps in which alkalising compounds of sodium, calcium and magnesium are used successively.

Deception is the Essence of Adulteration

This brings us to the other motive for the colouring of food—namely, to imply a superior quality. According to Stroud's Judicial Dictionary, "An article is adulterated when any substance other than that which the article purports to be is mixed with, or added to, or placed upon it, either to increase the bulk or weight or apparent size, or to give it a deceptive appearance," whilst the definition of adulteration given by the Society of Public Analysts includes the following: "An article shall be deemed adulterated in the case of food or drink if it contains any substance that gives it a fictitious value, unless the presence thereof be acknowledged at the time of sale." Thus, according to these two definitions, a food to which undeclared colour has been added to imply superior quality is adulterated. To deceive by giving a false label or advertisement is an offence under the Food and Drugs Act; surely, then, it is equally an offence, although not legally so, to deceive by the addition of colouring matter. To colour cakes yellow to imply the presence of eggs is as serious an offence as to state on the label "Made with eggs" when, in fact, no eggs are present.

The following is a quotation from Leach: "With the exception of confectionery (*i.e.*, sweets) and certain dessert preparations in which dyes may be employed purely for æsthetic consideration only, the use of colouring matters in food is mainly for the purpose of deceiving as to their true character." Such a statement appears, at first sight, to be rather sweeping. In order to test its validity let us take a quick glance at the main classes of artificially coloured food which pass through a public analyst's laboratory in order to form some idea as to the general motive behind the addition of colour.

Butter, for instance, is very frequently artificially coloured a deep yellow to imply a richness of quality. Before such addition was practised the yellow colour of natural butter afforded some indication of its carotene content, which substance can be converted by the body into vitamin A. But now that winter butter, which is of necessity deficient in carotene and vitamin A, is artificially coloured to resemble the more nutritious summer butter, the purchaser is unable to discriminate between the two qualities. The consumer may prefer to have his butter dyed rather than anæmic-looking, but this is only because a yellow colour implies richness of quality. There would certainly be no objection to the use of carotene itself for the colouring of butter. In the case of butter, then, colouring matter is usually added to deceive as to its true quality.

True Food Colours may Connote Dietetic Values

Dr. H. E. Cox in his paper "Dietetic Aspects of Colours in Food" says that it is now known that many of the naturally occurring matters in food have high dietetic importance as pro-vitamins, hormones or respiratory pigments and in other less well understood ways. He suggests that colours of these chemical types ought to be developed for colouring foodstuffs and that azo compounds or the like are not efficient substitutes from the dietetic point of view.

Food Judged by Colour

A yellow dye is added to most mass-produced cakes when the amount of egg added, if any, is insufficient to impart the colour required to suggest richness. Thus, the purchaser can no longer distinguish by appearance the article of good quality made with eggs from that baked without eggs. A so-called "perfect substitute for eggs" which was examined in Hull consisted of 96·3% water, 0·5% oil, 1·0% sodium bicarbonate, 2·2% cellulose gum and, of course, a yellow dye. It was the addition of the dye that enabled this sticky liquid to masquerade as a substitute for eggs. No one would have thought of purchasing it had it been colourless. Chocolate cakes and chocolate biscuits are frequently dyed a deep brown colour to suggest the addition of cocoa, and yet the proportion of cocoa present may be so small that the addition of an artificial essence is necessary to impart a chocolate flavour. Thus, once again, the main reason for the addition of colouring matter to cakes and chocolate biscuits is to deceive as to their true characters.

Factory-produced jam is also usually artificially dyed either to mask the use of unsound fruit, of preserved fruit pulp, of apple pulp, or to simulate a larger proportion of the more expensive fruit than is actually present in a mixed jam such as raspberry and gooseberry. Home-made jams and manufactured jams of high quality do not require the addition of colouring

matter to render them attractive. It is stated that the plant of some jam manufacturers is not large enough to cope with the flood of fresh fruit in its season and therefore the preserving of the excess of fruit, with the consequent loss of colour, is a necessity. If such is the case then jam made from sulphited fruit pulp and artificially coloured should, in my opinion, bear a declaration that colouring matter has been added. According to the Jam and Marmalade Order, 1942, Fresh Fruit Standard Jam, which is jam of the highest quality, must be prepared from fresh fruit only and, what is more, must bear a declaration on the label that it contains no added colouring matter or added preservative other than sugar. Surely it is more important that a declaration should be made when colouring matter has been added to a food rather than simply when it is absent. Even in the case of jam, then, colouring matter is usually added to deceive as to its true character and not merely to make the genuine article more appetising.

Lemon curd, instead of being prepared in the good old-fashioned way with butter, eggs and lemons, is more often than not manufactured from margarine, sugar, citric acid, lemon essence, starch and the inevitable yellow dye to represent the missing eggs. In fact dyes are sold for colouring food under such poetic descriptions as "egg yellow," "gooseberry green," "pea green," "kipper brown," "spinach green" and "brawn pink." Their mission in life is obvious from their names.

Artificial vinegar, sold under the description of vinegar and prepared from diluted acetic acid, is coloured with caramel to imitate its aristocratic ancestor malt vinegar. Aerated waters and fruit drinks are frequently synthetic products prepared from artificial essences and are coloured to represent the type of fruit by which they are named.

Sausages, meat pastes and fish pastes, containing large proportions of starchy fillers, may be coloured to imply the presence of a higher percentage of meat than is actually present.

The green colour of unripe fruits such as oranges, lemons and bananas is sometimes artificially changed to yellow by treatment with certain gases in order to simulate the ripened fruit. The purchaser only discovers that he has been deceived when the fruit is eaten.

In all the cases that have been mentioned—and the list could be extended—food has been artificially coloured mainly to deceive as to its true character and to imitate articles of higher quality. One is therefore inclined to agree with the already expressed view of Leach that the main motive for colouring food is that of deception. Many manufacturers who add colouring to food may not be intentionally dishonest, but the fact remains that the added colour very often produces a deceptive appearance.

When is Colouring Justified ?

Are there any cases at all where the addition of colouring matter to food is considered necessary in the interests of the general public ? It may be argued, for instance, that the poorer classes cannot afford the higher-priced food of good quality and therefore the addition of colouring matter to products of lower quality in order to render them more attractive is justified. There can be little quarrel with such a view provided that two conditions are fulfilled.

The first is that the purchaser should be notified of its lower quality, as was formerly the case, for instance, with jam of lower fruit standard. This would probably necessitate the setting up of official minimum standards for many types of food, a duty which in my opinion is long overdue. War conditions have spurred on legislation in this direction to a far greater degree than those of peace. For instance, statutory rules and orders have been passed which lay down standards for jam, marmalade, sausages, fish cakes, canned meat products and canned soups. All that would be required is the extension of such legislation to set up minimum standards for other articles of food.

The second condition is that the presence of added colouring matter should be declared.

If both these conditions were fulfilled—*i.e.*, notification of lower quality and declaration of added colour—the purchaser would be able to distinguish the genuine high-class article from one which is of lower quality. It may be said that the presence of added colouring matter does not necessarily denote a product of lower quality, yet it is difficult to think of more than a very few articles of food to which colour is added for any other purpose than to enhance its apparent quality.

Man, under modern conditions, relies to a large extent on his sense of sight in choosing his food, for he is unable to smell and state it prior to purchasing. Therefore it not only pays to advertise, but it pays to colour. It is of great importance, however, that the food of the nation should not be coloured in such a way that dyes deceive the eyes. Monier-Williams has said: "Life would be dull if no food were allowed to be artificially coloured. But it should be possible to differentiate between colour which may stimulate the appetite and increase the pleasure of eating and colour which is intended to hide from the consumer the real nature of the food. If it is a fraud to dye an unripe orange to make it look ripe, why should it be permissible to dye winter butter to make it look like summer butter?" he says. Or one might add to dye a biscuit brown to imply the presence of chocolate or to colour a cake yellow to simulate the addition of eggs.

No Legal Schedule

Our third heading is, What? What colouring matters should be allowed and upon what conditions.

Great Britain is the only leading country which has not a legal schedule of permitted colours. In this country any colouring agent may be added to food, except compounds of antimony, arsenic, cadmium, chromium, copper, mercury, lead and zinc. Gamboge, picric acid, victoria yellow, Manchester yellow, aurantia and aurine are also prohibited. The addition, however, of any other colouring agent which is injurious to health would be an offence under the Food and Drugs Act.

Other countries, including the United States of America, France, Canada, Australia, New Zealand, Italy, Spain, Sweden and Denmark, have drawn up lists of permissible colours.

So the question arises: Is it preferable to draw up a list of permissible colours or one of prohibited colours ? It is obvious that if only certain colours are prohibited the remainder may be legally employed so long as they are not injurious to health. Thus, a colouring agent may be used for a considerable time before it is proved

to be injurious, whereas if only certain colouring agents which have been previously proved to be non-injurious were permitted, this risk of possible danger to health would be avoided.

There is no doubt that in many cases proof of injury to the health of the human being is difficult to obtain. Much of the work that has been carried out to establish whether a particular dye is harmless or not has involved the use of dogs as test subjects. This does not appear to be a very satisfactory method of testing, for obviously dogs may react very differently from human beings towards chemicals. A dog's digestive powers are stronger than those of humans.

Matta found that the capacity to depress the human digestion is possessed not only by poisonous dyes but also by dyes which he had proved to be non-poisonous to animals. In bacteriology the addition of very small amounts of certain dyes to the culture medium will retard the growth of particular organisms and therefore it would seem possible that some dyes might adversely affect the action of enzymes in the body. So it would seem of importance that, if possible, all colouring matters, before being permitted to be used in food, should be proved by a competent authority to be harmless to human beings. If the effects of colouring matters upon the human digestive processes cannot be easily carried out in the body, then it might be possible to perform such tests *in vitro*, using artificial gastric juice.

Cumulative Poisons

It may be argued that the proportion of colouring matter added to food, ranging from about 1 part in 2,000 to about 1 part in 300,000, is so small that any particular colouring agent would need to be a deadly poison before any appreciable injurious effect upon health would occur. This argument does not, however, take into account the possible injurious effects which may be caused by the frequent ingestion of colouring matters which may have but mild toxic properties. It is known, for instance, that many synthetic colours have marked antiseptic properties even in highly diluted solutions and therefore they may adversely affect the digestive processes. In any case, surely it would be wiser to eliminate all risks by requiring that official physiological tests should be carried out upon colouring matters before they are permitted to be used in food. A harmless colour has been defined in Canada as one "which will not retard digestion nor have special physiological effects when consumed in quantities corresponding to 2 grains per day per adult."

Pigeon-holed Recommendation

The departmental committee in its report on "The Use of Preservatives and Colouring Matters in Food," published in 1924, stated that "It appears to us that definite evidence from direct experiments should be obtained as to the harmlessness of a dye before its use should be permitted in food. We have, therefore, come to the conclusion that a list of permitted colours should be prepared and that no colours other than those in such a list should be allowed to be used in the preparation of food. The list should, in our opinion, be prepared by the Minister of Health and issued by him, provision being made for the consideration of claims advanced by traders for the recognition and approval of additional colours on satisfactory evidence of harmlessness. We do not think that action such as this should seriously embarrass manufacturing interests, or is a course on which it is unreasonable, in view of the importance of the subject, to insist." Yet, in spite of these recommendations of the committee, no list of permitted colours was passed into law.

One argument against the drawing up of a list of prohibited colours is that even if a non-prohibited colour is proved to the satisfaction of a given court to be injurious to health, that decision is not binding on other courts and so there may be lack of uniformity. A certain colour may be permitted in one town and prohibited in the next, which fact might add to the difficulties of the large-scale manufacturer whose products are sold over a wide area.

Purity of Dyestuffs

The leading manufacturers of dyes for use in food no doubt exercise great care in their preparation and such products are normally free from objectionable impurities, but it is possible that other dyestuff manufacturers are not so particular concerning the purity of their products. For instance, about 1938 a firm was fined for selling "Damson Blue" containing 540 parts of lead per million. Therefore it would seem necessary that some official control over the dyes that are sold for use in food should be introduced. The manufacture of some dyes involves complicated processes, and it is stated that in the production of one particular colour more than a hundred chemicals are used and thirty different reactions, occupying several weeks, must be carried out before the finished colour is produced. One can easily see that there is abundant opportunity for the introduction of harmful impurities unless every care is taken to avoid contamination due to impure ingredients or by metals, if used, in the plant.

The departmental committee already referred to considered that the maximum permissible quantity of arsenic in any colouring substance used for food purposes should be one-hundredth of a grain per pound and that the total amount of lead, copper, tin and zinc should not exceed 20 parts per million. Thus, a dyestuff should be of a high degree of purity in spite of the fact that it is only added in very small proportions to food.

In America the Food and Drug Authorities issue certificates for each batch of dyestuff after it has passed thorough physiological and chemical tests. There is no doubt that if such tests were carried out in this country by officially appointed chemists and physiologists the health of the community would be more securely safeguarded from the possible ill effects of ingested dyestuffs. Under the present system it is apparently no one's business to detect the presence of harmful colours in food other than those actually prohibited, for obviously such work does not come within the scope of the public analyst.

Colouring should be Disclosed on Label

My last point is concerning the labelling of food containing added colouring matter. It has already been seen that colours are very frequently added to conceal inferior quality, or to simulate a valuable ingredient which is not actually present in the food. Therefore, in my opinion, the presence of added colouring matter should definitely be declared to the pur-

chaser either by a label attached to the article or by a notice displayed in the shop. Such a declaration would help to counteract unfair competition. It is true that the departmental committee reported that, "If a list of permitted colours is prepared in the way we have suggested, we do not think that, as far as health considerations are concerned, a declaration of their use need be required." It is obvious that the committee made that recommendation from health reasons alone and did not take into account cases where colour was added to conceal inferior quality.

The food laws of this country lag far behind those of some others and the tightening up of legislation in this respect is overdue. The following countries make the declaration of added colours to some or all types of food compulsory: The United States of America, Canada, New Zealand, Australia, Germany, Italy and France. Argentina takes a bold stand and prohibits absolutely the use of artificial colours in food; only harmless natural colours in certain instances are allowed.

In America a food is not covered by a declaration of the addition of colouring if it is added to make the food appear of better quality or of greater value than it is. Also in America the labels of compound food, such as confectionery, must have a list of the quantities of the separate ingredients, exemption being allowed where there is of necessity insufficient space on the label to accommodate all the statements and information required. Unpacked confectionery, owing to the difficulty of labelling satisfactorily, is exempt.

In conclusion then, in my view there is no objection to the artificial colouring of food provided that the colouring agent employed has no adverse effect upon the human organism, that it is not added to imply superior quality or to otherwise deceive, and that its presence, where practicable, is declared to the purchaser.

Editor's Note.—We submitted the foregoing article to another well-known public analyst, Mr. Thomas McLachlan, A.C.G.F.C., F.I.C., whose comments follow.

Mr. Thomas McLachlan Replies

In attempting to dissect Mr. Bagnall's address, I will first take his final paragraph: "In conclusion then, in my view there is no objection to the artificial colouring of food provided that the colouring agent employed has no adverse effect upon the human organism, that it is not added to imply superior quality or to otherwise deceive, and that its presence, where practicable, is declared to the purchaser."

There is nothing in the foregoing with which any reasonable person would be likely to disagree, but it may be useful to examine the matter of deception. The man who wears a well-tailored suit is deceiving both himself and other people. The tailor has cut the suit to hide as much as possible any physical blemishes present in his client, and the wearer is able to hide them from other people. Again, what is women's make-up but deception? The fact is that from time immemorial mankind has had recourse to make-up, not only for his person but to the food he consumes. Whether the public analyst agrees with it or not, man insists upon this make-up and upon being deceived to a greater or less extent, and our endeavours must be concentrated in a way to ensure that he is not deceived to his disadvantage.

When is Deception Legitimate?

Owing to circumstances an unfortunate mother is unable to obtain genuine custard powder, but finds that she can make quite passable preparations for her children with dried egg, to which they do not object too violently. Is this deception justifiable or not? It may perhaps be said that this is an extreme case, and in my opinion the term custard power ought never to have been permitted by public analysts when these powders were first introduced. Prompt action should have been taken by the old Local Government Board and by public health authorities all over the country to see that foods were not debased and that the populace were not misled. It is, however, a fact that many children during the last thirty or forty years have been brought up to think that genuine custard is made with a coloured powder, and in complete ignorance of the fact that custards were originally made with milk and eggs.

There are few people who are indifferent to the appearance of their food, and it must be admitted that palatability is influenced to a considerable extent by this appearance. Many things help to make up the appearance of foods—colour, brilliance, translucence, texture, etc., but probably the chief of these is the colour. Who would attempt to give a children's party and invite the young guests to sit down to a meal consisting of bread, uncoloured butter or margarine, uncoloured cheese, uncoloured lemonade, uncoloured custard, uncoloured jellies, uncoloured cakes and other insipid-looking foods?

The Masking of Inferior Quality

Probably the most pregnant remark in Mr. Bagnall's address was his reference to the necessity for a declaration under the Jam and Marmalade Order, 1942, that Fresh Fruit Standard Jam shall bear a label stating that it does not contain added colouring matter or added preservatives other than sugar. This is one of the finest examples of muddle-headedness in legislation in this country, unless it be described as one of the most flagrant results of the activities of vested interests in high places. It is equally surprising that these standards describe jam as of full-fruit standard when they contain only 20 per cent. of raspberry fruit pulp, but that is not the principal matter under discussion here. The average housewife is astounded when she learns that the finest quality jam contains so little fruit, and she has always believed it necessary to have 66% of any fruit in the final preserve. She is also surprised to learn that the fruit used in making her jam has been first decolourised and then recoloured. What surprises her most is not that the fruit has been decolourised and then recoloured, but that it is possible for such a thing to happen and for it to be a commercial proposition. Under the circumstances one hardly feels that the deception employed is very harmful.

Can it be truly said that the artificial colouring of jam is the masking of inferior quality, provided that the jam has been prepared from first-class pulp? Under modern conditions it is doubtful, though it is equally doubtful whether modern conditions are really leading

us in the wisest direction in this matter and whether it might not be preferable to bring our jam factories closer to the fields where the fruit is grown and then make the jam while the fruit is fresh. In any case, my view is that the firm which produces good jam from fresh fruit should be in a much more favourable position than it is at present, and that the public should be educated to be willing to pay more for the best quality.

Public Education

Such educational efforts will have to be exerted primarily along two paths. There is little doubt that dieticians will concentrate more and more in the future on persuading people that fresh foods are necessary to sustain maximum efficiency, and that preserved foods while possibly necessary owing to the growth of civilisation and the consequent concentration of populations, can only be employed as supplements. There is little doubt also that dieticians will have to carry out research and to educate people as to the extent to which these substitute foods are sufficient or deficient, and they will have to advise our health authorities and persuade them to pass laws which will prevent the foisting on the public as genuine substitutes things which are grossly deficient in essential constituents, which are present in the genuine articles. It will, however, probably always be impossible to prevent a certain amount of make-believe with regard to foods. Anyone who goes to a vegetarian restaurant and has a nut-chicken cutlet knows that there is no chicken in it, but vegetarians find it necessary, by the use of such names, to keep their adherents' thought working along recognised paths and so encourage them to enjoy their food.

Man is a conservative animal and when he becomes accustomed to a particular thing he dislikes the idea of a change. The result is that manufacturers have to standardise the colour of their products or they would have innumerable complaints about the irregular quality of the article.

People from the south find cakes and pastries in the north of England very pale-coloured and are apt to think them insipid, while, on the other hand, it used to be the custom in the south-west country to add saffron to practically all cakes and even to some pastry to give them a rich yellow hue. If Mr. Bagnall had been a works chemist to a food or pharmaceutical manufacturer, he would probably have had to deal with many complaints made simply because the colour of an article was abnormal; most public analysts receive samples submitted by members of the public because the appearance, usually the colour, is not up to standard.

What Colours should be Permitted ?

Mr. Bagnall is not altogether too successful in his choice of satisfactory methods of colouring. For instance, he would appear to agree with the colouring of meat by the pickling process, whereby an unknown quantity of nitrate is reduced to nitrite, but presumably the direct use of nitrite in known amount would come under his heading of artificial colouring. Later, he recommends the use of lime in order to retain and improve the colour and hardness of peas, yet dieticians have informed us long ago that the addition of alkali to food destroys the vitamins. As a third instance, he suggests that caramel is only added to artificial vinegar to make it look like malt vinegar, but if my information is correct all malt vinegar at present sold to the public is artificially coloured with caramel, for the simple reason that modern brewing of vinegar produces a much paler product than that obtained formerly.

Government Control

In the matter of Government control I mainly agree with Mr. Bagnall. There is no doubt that, in the matter of food, man has lost the primitive instinct of the wild beast by which he knows what foods are good and what foods are bad or deficient. Nor does it appear probable that in a matter of a few years man can adapt himself to a diet which is deficient in certain essentials, though he still possesses a remarkable facility to adjust himself to resistance to certain chemicals. For example, it is already being suggested that we are building up a resistance to the sulphanilamides.

On the other hand, the numerous articles published on food poisoning would suggest either that modern food is being systematically poisoned or that our resistance to infections is being equally systematically lowered and, in my submission, the latter is the more correct view. Man, being childlike in his knowledge and make-up, is dependent on those with specialised knowledge to keep him fit as well as for his treatment when ill, and it is usually believed that it is wiser to spend money on keeping well than to lose money by wastage of man-power owing to sickness. Consequently, it would be far wiser for the Government to allow certain permitted colours in certain limited quantities rather than to prohibit completely a very few colours as happens under the present Regulations. I am not an anti-vivisectionist, and do not subscribe to Mr. Bagnall's views about experiments in connection with the toxicity of colours. Carrying his argument to its logical conclusion, he should allow manufacturers to employ any colour in any known quantity, so long as the experimental customer knew the amount being consumed and there were sufficient pathologists and chemists to make the necessary examinations on any resulting corpses. It may not necessarily follow that all experimental results obtained on animals can be transferred direct to man, but by working on a larger number of animals and a comparatively small number of human beings one can find fairly accurate data from which to draw satisfactory conclusions with regard to the action of poisons, foods, drugs and bacteria on the human system.

That being so, I believe that a list of what are believed to be satisfactory food colours should be drawn up and that only colours on this list should be permitted. It should be possible for manufacturers to submit names of other colours for inclusion on the list if they feel that they have satisfactory evidence as to their superiority from the colouring standpoint and also from the standpoint of toxicity. Further, if possible, the list of permitted colours should be arranged not nationally, but internationally. If we can obtain international standards for drugs for the treatment of disease, such as insulin, there is no reason why we should not obtain them for those things necessary to safeguard our health. I endorse the suggestion that the addition of all colouring matters to foods should be disclosed on the label, and think that the Defence (Sale of Food) Regulations, 1943, are a step in the right direction, provided that they are carried out effectively. Personally I have found no trouble about eating American goodies which declare on their label that they contain added colouring and (artificial) flavouring.

Post-War Nutritional Relief

IN THE darkest days when we stood alone no one in this country was so downhearted as to doubt our final survival. It is not surprising therefore that with real causes for optimism in the success of our arms we should now accept victory as a foregone conclusion, to be planned for and worried over rather than welcomed with the jubilation that marked the Armistice of 1918. The diversion of Lord Woolton from his vital duties in the Ministry of Food to undertake even more Herculean tasks in national reconstruction is eloquent of the present mood of confidence in official circles. No less optimistic is the injunction to U.N.R.R.A., the United Nations' Relief and Rehabilitation Administration, to be ready to commence nutritional and other relief in parts of liberated Europe in six months' time. We are, in fact, preparing for peace much more thoroughly, and let us hope more efficiently, than we planned for war.

Two Stages of Relief

The inter-allied conference of food experts at Hot Springs, U.S.A., has emphasised that nutritional relief must be considered in two stages. The first "short term" stage will cover the immediate relief of starving populations by the import of foodstuffs or other means. No attempt will be made to attain optimal dietary standards, nor to relate relief to the economic circumstances of the country concerned. The second, or "long-term" stage, will concern the planning of each country's nutritional and agricultural policy so as to ensure the greatest possible production of suitable foodstuffs throughout the world, and their distribution, where necessary, by export and import so as to attain optimal nutrition in all countries. It is intended that the first stage of relief should be applied to all countries before any country passes on to the second stage. In other words, "Bread for all before cake for any."

Malnutrition in 1919-21

At a recent meeting of the Nutrition Society, held in London to discuss problems of nutritional relief, Professor J. R. Marrack and others spoke of the lessons which must be learnt from experience after the last war. Deficiency of food in Continental Europe at the end of 1918 was due much more to failure of production than to cessation of importation. Men and horses had been diverted from the land to the battle fronts. Scarcity of artificial fertilisers was the first step in a vicious circle of reduced crops, reduced fodder, reduced livestock and reduced animal manure. Moreover, wide areas were laid waste by the actual impact of war, and peasants returned to find their prosperous holdings a tangle of weeds and shrubs. Production of cereals for the whole continent decreased by about one-third. In livestock the reduction varied from only 14 per cent. in France to over 70 per cent. in West Poland, but since the animals were not only few but also lean the fall in meat production was much greater. Milk production in Germany was only one-third of the pre-war level.

The effects of dietary deficiency on health were extensive and severe. Loss of weight and energy through general dietary insufficiency was presumably widespread. Mental outlook was depressed, and there was a craving for fats. More serious symptoms were hunger œdema, which is believed to be caused by protein deficiency, and many of the diseases which are now well known to be due to deficiency of specific vitamins. Thus deficiency of vitamin A led to xerophthalmia, and often blindness, in Danish infants, who suffered from want of the butter fat which was exported to Germany. In Austria there was an alarming incidence of infantile scurvy and rickets, and also adult osteomalacia, which were investigated after the war by Dr. Chick and her Lister Institute colleagues in their classical expedition to Vienna. Another serious effect of dietary deficiency, probably mainly of protein, was seen in the great increase in juvenile tuberculosis. Finally, although perhaps it may be considered only as an indirect effect of the last European war, we must remember the terrible famine in Russia in 1921-22, which caused the loss of 3 million lives, mainly through sheer starvation.

1919 Relief Measures

In the unsettled atmosphere immediately after the war countries had little hope of obtaining loans to facilitate trade through the usual channels, and special machinery had to be set up in order to feed the 160 millions of people in Europe who were faced with partial or complete starvation. Most of the relief was financed by special credits granted by various Governments, notably that of the U.S.A. In all, some 4 million tons of flour and grain, lesser amounts of pork products, and some surplus army foods were imported. Large though the amount may seem, it was by no means adequate to cover requirements. The whole importation of food by the official relief systems, which were closed down in September, 1919, was less than in a corresponding period before the war, and did not make good the deficiency in the wheat harvest alone. Less food was supplied to Europe during the whole relief period than was imported into Great Britain in 1918, when our food imports were at their lowest ebb. Subsequent relief depended upon charity, and mainly took the form of meals for children.

The Present Nutritional Position in Europe

According to Dr. J. Hammond, the production of cereal crops is now probably 10 per cent. below their pre-war level, although high milling reduces the deficit as far as humans are concerned. The number of farm animals is probably decreased by 25 per cent. Professor Marrack estimates that at least 10 million cattle have been killed off, with a resulting deficiency of meat, milk, cheese and butter. From knowledge of rations on the Continent he calculates that the average normal consumer is at present receiving 1,400 Calories per day, which implies a deficit of 600 Cals. per day. The degree of deficiency probably varies from a deficit of more than 1,000 Cals. in Greece, Poland and Spain to almost complete adequacy in Germany. The slaughter of cattle has led to deficiencies of meat, milk,

cheese and butter. Another authority, Dr. Geoffrey Bourne, has given more detailed figures for the year 1942. In contrast with a pre-war level of 3,000 Cals. the rations in Bohemia and Moravia provided 1,800 Cals., in Norway 1,200, Denmark 1,400, Holland 1,300, Belgium 1,000, France 1,000, Serbia 1,000, Croatia 900, Greece 500. In Eastern Poland the Poles received 700 Cals. and Jews 500 Cals., while in Western Poland the intake was 1,000 Cals. There was severe deprivation in occupied Russia. For the rest of Europe 1,000-1,500 Cals. could be taken as typical, with a tendency for malnutrition to be worse in towns than in the country. The power to allow or deny foodstuffs to occupied countries according to their value in the war effort is undoubtedly a valuable weapon in Germany's hands.

Except in those areas where famine is general, it must be inferred that the worst sufferers from dietary deprivation are children over five years old, since supplies of milk will be kept for infants under that age. Such figures as are available suggest that deficiency in first-class protein has again led to an increase in tuberculosis. Deficiency of vitamins may be less serious than might be expected. Rickets is found less frequently in Belgium than formerly on account of the distribution of vitamin D. The addition of vitamin A to margarine reduces the danger of acute deficiency of this vitamin. Scurvy is prevented by the extensive consumption of potatoes, which also have the advantage of giving a high yield of Calories per acre. The use of flour of high extraction not only provides more bread, but also minimises the risk of vitamin B_1 deficiency, which may be expected only in those regions where maize is a principal article of diet.

Relief from Starvation

Authorities may differ in their interpretation of the patchwork of official figures, rumours and guesswork which makes up our knowledge of the food situation on the Continent. It would be too much to hope, however, that the horror of war should not somewhere give rise to the twin horrors of famine and pestilence, and reports from Greece indicate that here at least large numbers are dying for want of food. For the Greeks and others in a similar plight, there must be no half-measure in the application of relief. Military liberation must be followed immediately by the importation of foodstuffs sufficient for current needs until the agricultural and economic life of the country has been restored. If official steps to prevent starvation should necessitate a continuance of rationing in this country, even with temporary reductions, the public should be made well aware of the reason of their sacrifices, and would doubtless abide with patience any necessary deprivation.

Without question the first requirement for relief in starving countries will be for Calories, which in Europe usually implies grain for making bread. The second requirement is for fat, to be used as butter or otherwise. Thirdly, infants and young children will require large quantities of dried milk. Arrangements are also under consideration to supply needy children with a mixture of vitamins, made up in chocolate. Such requirements cannot be denied, and steps should be taken as far as possible to build up reserves to be ready when wanted. It is important, moreover, to arrange that the countries should receive foodstuffs acceptable to their tastes and food habits. Dr. Audrey Russell reports that in relief work in Spain during the civil war a consignment of unfamiliar beans caused a serious outbreak of gastro-enteritis. In Bengal little benefit has sometimes been derived from the distribution of wheat, since the natives have only facilities and experience in cooking rice. A century ago attempts to relieve the Irish potato famine by imports of maize often lead to pellagra. It is fortunate that surplus army foodstuffs are generally excellent for relief purposes.

It must be realised, however, that the first part of the " Hot Springs " programme includes much more than the mere relief of starvation, and aims at the establishment of a plane of nutrition equal to that now prevailing in this country. This will imply an allowance of Calories varying from 900 per day for a young child, up to 4,000 Cals. daily for an adult engaged in heavy manual work. Milk will be needed at the rate of 300 ml. daily for adolescents of 4-21 years old, and at 800 ml. daily for those 6 months to 3 years old, and for expectant and nursing mothers. The annual allowance for adults in high-class proteins could be supplied as 30 Kg. of meat, 76 Kg. of milk, 4 Kg. of cheese, 3 Kg. of eggs, and 10 Kg. of fish.

Since these levels of animal protein were not attained in Southern and Eastern Europe even before the war they may suffice with less than the full amounts at least during the first stage of relief. But even with this economy enormous amounts of foodstuffs will probably be required, and an early realisation of the programme may demand both careful planning and unselfishness on the part of the better fed countries. Policy in relief must be based on the necessity to economise transport. Apart from the immediate relief of starvation, therefore, the aim must be to increase crops and livestock in the liberated countries by supplying seeds, fertilisers, and machinery for deep ploughing. These will require much less shipping space than the foodstuffs which can be produced with their aid.

It is helpful that cattle can be fed on materials which are unfit for human consumption. In order to increase milk production dairy cows, and others capable of reproduction should therefore be preserved from slaughter and their number increased by artificial fertilisation with semen of pedigree bulls. It has been calculated that about three times more land is required to feed an individual on a diet rich in animal protein than on a mainly vegetarian diet. To satisfy immediate and necessary demands for meat, therefore, adequate stocks should be accumulated now in canned or dehydrated form, and the raising of animals for meat in liberated countries should be postponed. In particular the breeding of pigs and poultry should be discouraged since some of their food is suitable for direct human consumption.

The contribution of British Agriculture to the relief programme will be to maintain, and if possible improve, its present high rate of production. The demand for cereals on the Continent and in the Far East will probably cause a continuation of the present shortage of concentrated animal feeding stuffs. Since for the same amount of fodder the yield of milk is much greater than the yield of meat it is advisable that such food as is available should be devoted mainly to milk production. Home-produced meat will, therefore, remain in short supply.

The second stage of the " Hot Springs " programme, with its goal for attaining optimal nutrition throughout the whole world, is intended to await the completion of the first stage of relief in all countries. For the present, therefore, we may look forward to the land of plenty in a spirit of hope, rather than enquire too closely into the problem of ways and means. Some weighing up of the benefits which may accrue to mankind through improved nutrition, based on co-ordinated agricultural and economic policies, and of the difficulties and perplexities to be faced in attaining the dietary millennium, may not, however, be out of place. Our first care must be that, in the new and better world for which we all hope, the old reproach of " starvation amid plenty " will be heard no more.

It is surely not beyond the wit of man to devise means of diverting surplus foodstuffs from overcrowded storerooms to hungry mouths, and here the acumen of the food manufacturer may play a vital part. We are told, however, that even when all the foodstuffs at present available have been equitably distributed there will still not be enough food to satisfy the optimal requirements of the whole world. New land must, therefore, be opened up for cultivation wherever it is available. The cropping of old land must be carefully reviewed to ensure that it is put to the best possible use. Much could be achieved by a more widespread use of artificial fertilisers. Countries must produce those foodstuffs which they can grow in greatest abundance, and obtain products which they can grow less successfully by a system of co-ordinated exchange. In a better fed world, where most countries are linked with their neighbours through the friendly exchange of foodstuffs and other commodities, we may hope that lack of *Lebensraum* will not exhaust the patience of future dictators.

The Santa Claus Complex

At our present stage of progress, however, certain difficulties in the realisation of optimal nutrition throughout the world cannot be overlooked. In the first place we may question, with Surgeon-General Evang of Norway, the reliability of the " Santa Claus " complex as a lasting solution of the problem of sharing the world's food supplies. When the first flush of post-war generosity is over the old truism of " Heaven helps them that help themselves " may once again come into its own.

Secondly, even if we assume a prolonged continuation of the spirit of " lease lend " on the part of our American Allies, difficulty will be experienced in agreeing upon standards of nutrition which are consistent both with the liberal diet to which Americans have been accustomed, and with the possibility of raising the rest of the world to the same levels. This problem is aggravated by the very high estimates which have been made by American dietitians of the amounts of the various nutrients which they consider to be necessary to ensure optimal nutrition. It has indeed been calculated that if the required standards are to be attained throughout the U.S.A. it will not only be impossible to continue to help Europe with food, but necessary to produce or import 11 per cent. more food than is produced at present.

To what extent, therefore, will the better-fed countries respond to the requirements of those less fortunely placed? Doubtless we shall tighten our belts, if necessary, to help our liberated allies in dire distress. When we come to Stage 2 of the Hot Springs scheme, however, it is doubtful whether there will be an equally ungrudging response either here or in America. While the improvement of the lot of chronically underfed peoples is certainly a praiseworthy object, the problem should be approached with discretion and a sense of balance. It is questionable how far we should be justified after the war in asking British mothers and children to be contented with their present limited diet in order to improve low dietary standards which existed before the war, possibly in remote and backward parts of the earth. In taking the long view we must realise that in highly civilised, well-fed communities the limiting factor in reproduction is usually birth control. In backward communities one of the most important factors must be the supply of food. Removal of one limitation, without the corresponding imposition of the other, would in time lead to an increase, whether desirable or not, in the ratio of backward to highly civilised populations. In this country our declining birth-rate surely justifies a policy to secure the best possible nutrition for the relatively few children that are born.

But if some of us may lack the vision and faith that strengthens the prophets of Hot Springs, none can deny the magnitude of their task, or dispute the urgency of the problems to be faced when the war is over. In the words of Lord Horder, " Food will be First Aid." The Food Industry of this country will doubtless rise to the occasion, and play a noble part in the work of rescue from starvation in a war-stricken world.

Milk Distribution

(*Continued from page* 49)

out in the laboratory. It should also be noted that 33 of these 51 samples gave satisfactory resazurin readings—*i.e.*, discs number 3½ to number 6. If this point is developed further we can see that a farmer could be complimented upon the satisfactory result of the resazurin test on his milk, while the dairyman who pasteurised that milk could be severely criticised by the local Public Health Authority for high bacterial content of pasteurised milk.

In this paper I have dealt with the hygienic aspects of milk handling chiefly because of the economic effects which are likely to arise. Hitherto the various bodies which are concerned with the control of milk in this country have been reluctant to deal with these problems until they have become serious in their incidence, and it is to be hoped that the future activities of this society may prove of much assistance to the country and to the dairy trade in this connection. There are, of course, many other problems, and quite an important one is that of the non-fatty solids content of milk, but I believe that this aspect may be dealt with in a subsequent paper at this conference.

Lastly, many dairymen are operating under wartime conditions with much reduced staffs, and there is great need of improvement in the educational and technical ability of " key " workers in many dairies.

Microbiology and Man

THE past five years have seen the publication of a number of works on microbiology. The latest contribution* to the subject, by Dr. Birkeland, although published last July, appears to be a recent arrival in this country. It is a well-produced and readable book of nearly five hundred pages, at a price which in these days may reasonably be termed modest. Though largely preoccupied with disease organisms, the book endeavours to give a general view of the part played by micro-organisms in everyday life.

We read in the preface that "upon the author of a textbook falls the burden of selecting . . . ", and only those who have written a book on microbiology realise how difficult it is to satisfy all readers. It is therefore a statement rather than a criticism to say that the present volume gives only a perfunctory account of bacteriological technique and of the mould fungi and yeasts, and omits altogether such subjects as plant diseases, human mycoses, industrial fermentations (other than alcoholic), and various minor matters of interest to the economic microbiologist.

The first section of the book (130 pages) deals adequately with fundamental principles. The account of the bacteria given in chapter iv, and in the appendix, is in accordance with the latest edition (1939) of Bergey's classification. The author is less at home with the fungi; there is little to be said for classifying the bacteria as fungi, and less for detaching the yeasts from the ascomycetes, as is done on page 30. The physiology and biochemistry of bacteria are well summarised, and there is much sound and useful information on antiseptics. The statement, however, that lysol is "about five times as powerful as phenol" should not be taken too literally, at least with regard to samples of lysol as sold in this country.

Section II gives, in 50 pages, a very readable introduction to the study of infectious disease, and the main bacterial and virus diseases of man and animals are then dealt with fully in Section III (184 pages). This section forms the body of the book, and is treated with an historical bias that makes for easy reading by the non-medical reader.

The last section of the book (76 pages) deals briefly with certain aspects of industrial microbiology. The chapters on food and dairy products are sound, though not exhaustive. The account of such food infections as trichinosis and tapeworms seems rather out of place in a treatise on microbiology.

Water and sewage are dealt with from a municipal engineering, rather than a purely bacterial, standpoint, but the author gives a clear and concise account of modern methods. Interesting, though somewhat extensive, quotations are given from the writings of two London physicians, Budd and Snow, who in the mid-nineteenth century sought to prove that cholera and typhoid were water-borne diseases.

In discussing sewage disposal the author mentions the "development of the water closet around 1850". In view of his liking for the historical approach, he would be interested in the working diagrams given by Sir John Harington in his amusing pamphlet "The Metamorphosis of Ajax", published in 1596 and read by Queen Bess. Harington was the inventor of the modern water closet, but was unfortunately two and a half centuries ahead of his public.

Dr. Birkeland's book concludes with a brief note on soil bacteriology, a bibliography that might well be extended in future editions, and a glossary.

L. D. GALLOWAY.

* *Microbiology and Man.* By J. Birkeland. 1942. Pp. x+478. 22s.

Grain Drying

HERTINGFORDBURY MILL had been disused for some years when taken over by the Hertfordshire War Agricultural Committee last summer. Instead of standing idle it is now a grain-drying and storage depôt working day and night.

A minimum of 2 tons per hour can normally be dried with a 6 per cent. moisture extraction. From the intake hopper 20 tons of grain per hour can pass by elevator to two pre-drying bins, each with 15 tons capacity. The large intake ensures the quick despatch of delivery lorries. The pre-drying bins make it possible to dry and clean one kind of grain while another is being delivered into the hopper. Together with the post-drying bins, they also make it possible for the plant to be operated at night by a single charge hand.

From the pre-cleaner the grain passes to the drying column, where, at a nominal hourly capacity of 2 tons, it is subjected for 40 minutes to 5,000 cubic feet of hot air per minute. It then goes to the cooling section, where for 20 minutes it is subjected to about 3,500 cubic feet of air per minute at atmospheric temperature. The gas-fired furnace at Hertingfordbury is unique. It is rarely that this type of plant has gas laid on, and the arrangement is ideal as it requires no stoking and provides hot air, the temperature of which is thermostatically controlled.

In its passage down the drier the grain is thoroughly turned over, and this feature, in conjunction with the calibrated discharge arrangement on the drier, ensures even treatment of the grain. After drying, the grain is elevated to a final cleaner.

The aggregate storage capacity of dried grain in bags and bins is about 450 tons.

The main drying and cleaning plant is driven by a 12-h.p. motor coupled to the original water turbine of the mill, which was put in order when the mill was renovated. Sometimes the water turbine can be used exclusively, effecting a great saving of fuel; sometimes, when the river is dry, the motor does all the work.

The Hertfordshire Committee is charging the same price for grain drying as farmers and drier-owners working as contractors—a minimum of 20s. per ton for drying and a further 5s. per ton for cleaning. These charges do not take into account loss in weight through drying. Where grain is delivered to the drier in a very wet or dirty condition these charges are usually increased.

BOOKS RECEIVED

Pasteurisation. By Harry Hill, F.R.San.I., A.M.I.S.E., F.S.I.A.

Wartime Food Management. By Joseph S. Davis, Ph.D.

The Future of Food Dehydration

T. CROSBIE-WALSH, F.I.C.

IN PLACES "where merchants most do congregate" the question, What is the future of dehydration? is propounded and discussed. The fact that nobody knows does not rule out the interest and perhaps the value of conjectures on the subject.

There can be no possible doubt about the value of dehydrated foods for armies in the field, and it is probable that they will be invaluable in the immediate post-war period in connexion with the feeding of the countries of Europe, over which broods the spectre of famine. But when things have settled down and the situation has become normal, what will be the position of these foods?

American Opinion

Dr. Cruess, of California, recently said that "it would seem that the dehydration of vegetables for the armed forces will be an important industry for some time to come, and that with further curtailment of tin supplies there may be some development for canteen use to supplement fresh storage and frozen pack. But what will happen after the war is anyone's guess. Judging from the experience after the last war the future for dehydrated vegetables is problematical, to say the least".

Roy F. Hendrickson, Director of Food Distribution, Department of Agriculture, U.S.A., writing more recently in *Domestic Commerce*, June, 1943, considers that "in the light of experience thus far, some dehydrated foods appear to be 'war babies' pure and simple, while others show enough promise to warrant the enthusiasm they have aroused among the food experts". Obviously conditions in the U.S.A. differ fundamentally from those in this country, but the possibilities of dehydrated food in America seem greater. For instance, in the matter of dried whole milk, it is known that fluid milk can be produced much more cheaply in the Corn Belt of the U.S.A. than in many urban milksheds. The main thing retarding a greater peacetime production in the Corn Belt is the perishability of raw milk, together with the cost of shipping it in fluid form to the thickly populated East. Dry whole milk helped to solve the problem of perishability and greatly decreased milk costs to consumers.

Such a problem does not present itself in this country, and after the war dried milk will probably again take its place, not in the household but in the food factory.

Dried Eggs

Dried eggs have received a tremendous boost in this country, and should be appreciated for their excellence at a time when the fresh egg has become the stand-by of the music-hall comedian.

In view of the virtual disappearance of the shell egg, it is amazing to read what Mrs. A. G. Astin, Food Advice Organiser for the Ministry of Food on Merseyside and in Cheshire, says: "Dried eggs . . . are not sufficiently used in catering establishments and canteens. Only 20 per cent. of the amount of dried eggs to which they are entitled is being used in these establishments." If catering establishments and canteens thus ignore this dried product, it may be asked: What is the percentage of domestic consumption? It is probable that shell eggs, imported and otherwise, will oust the dried variety in the domestic market after the war. The latest American prognostication is:

> To what extent housewives may keep dry eggs available for home cooking is a gamble which some processors are going to investigate in the post-war period—just as pioneers have pitted their money, skill and hopes for good luck in enterprises ranging from introducing frozen foods (successfully after early failures) to playing casino (usually unsuccessfully after early successes).

Vegetables and Meat

Mr. Hendrickson, dealing with dehydrated vegetables, differentiates between kinds. "Potatoes and onions seem to have some good post-war possibilities, and also soups. There has been only limited expansion in dehydrating meats. It is a passable food for war purposes and better than no meat at all. Dehydration adds nothing to meat flavour or food value. In case of flavour, the loss seems particularly heavy."

The fate of dried meat in this country is still to be ascertained. Domestic consumers do not know it, although it is probable that they have unwittingly sampled it in commercial meat pies. We were told recently that consumer tests with dehydrated fish were going to be carried out in canteens and restaurants, and that the consumers would be eating it without knowing it. Should they be informed after a reasonable time, they would probably be as surprised as the gentleman who was told that he had been talking prose all his life.

The key to the riddle of dehydrated meat, fish and vegetables would appear to be its use in canteens and restaurants. "Dolled-up" food is anathema to the average British family, but any deficiencies in flavour and presentation can be corrected by the skilful hands of the hotel *chef*, and "good plain food" is not so strenuously demanded by the restaurant *habitué*.

The Agricultural Outlook

The repercussion of food dehydration on British agriculture is being discussed in some quarters. There is a fear of its possible effect on the home agricultural market. The suggestion is that the big agricultural producers of the American Continent and the Antipodes may be able to flood Britain with dehydrated food products—their past success with frozen and refrigerated meat is quoted as a precedent.

One agricultural writer calls the attention of farmers to the possibilities or dangers (according to the way it is viewed) of, for example, dehydrated full cream in block form, which would keep, for all practical purposes, indefinitely. On a large scale the cost of processing would be approximately 1d. a gallon. It is a

fact, states the writer, that dairy farmers should note, or they will find themselves competing with a foreign product practically as good as their own, and a far more serious rival to their trade than tinned milk has ever been. The opinion is expressed of dehydration generally, that, "properly worked and controlled, it can be made a boon not only to the British public but to the British farmer". Unfortunately we are not told *how*, but the writer states that it is good to know that the Farmers Union and the Ministry of Agriculture have the matter under consideration.

It is the same old cry—"We've got to be prepared". But how? When?

Judging from the consensus of present opinion regarding dehydrated food, it would seem that the farmers need not worry overmuch, except in regard to specialised products, of which, perhaps, dehydrated cream is one. Even then the betting is that the average consumer, if offered the old-style carton of liquid cream and a block of dried cream, would take the former. Which, perhaps, the would-be post-war processor will call sheer cussedness, but with which nevertheless he will have to contend.

Survey of Wartime Diets

IN A SURVEY of wartime diets in the United States, made by Professor Harry Taub, of the College of Pharmacy of Columbia University, he attributes the cause of most of to-day's food problems to the American public's bad eating habits rather than inadequate supplies, and much of what he says can be applied to this country. Intensive Government campaigns to make people aware of the need for a well-balanced diet and of the high nutritive value of food substitutes have failed to change our eating habits, he points out.

"Since some of the more staple and popular foods may not be available in sufficient quantity for several years after the war, when we will be confronted with the task of feeding other nations, the Government needs to develop a more adequate programme to educate the public.

"Eating habits are so fundamental and hard to break that it will take many years to re-educate the nation. The only satisfactory solution is to begin training school-children. During the transition period, however, we shall have to look at the problem practically and try to meet the food problem by keeping in mind the average American's food preferences.

"Many are aware of the imbalance in their nutritional habits, but, rather than change and introduce new foods into their daily menus, they prefer to depend on vitamin pills. We shall have to accept this attitude for the present, as it is not particularly harmful. All efforts must be concentrated in teaching the public to accept and use the more essential food substitutes.

"In the post-war period meat substitutes utilising yeast and soybeans will be available in abundance, and emphasis must be placed on overcoming the average person's laziness in adopting these food extenders. We may have to cut down eventually the amount of food we eat, but this will probably modify one of our worst habits—overeating.

"The appearance of poorer grades of foods, which sometimes are less tender and attractive in appearance, has made the public feel that they are buying inferior and defective products. Actually, cheap cuts of meat are in no way inferior, and fruit and vegetables with spotted appearance are just as good. People seem to confuse appearance with nutritive value."

British Coal Research

COAL research is now by far the largest of the co-operative industrial research enterprises in this country, said Sir Evan Williams, Bart., in his presidential address at the annual meeting of the British Coal Utilisation Research Association.

In view of the paramount importance of deriving from coal not only heat and power for the home and for industry, but also liquid fuel and materials required by the chemical industry, the coal industry has undertaken the responsibility for hydrocarbon research; and the colliery owners are contributing for this purpose a fund of the order of £400,000 to £500,000 over the next two or three years.

The Research Association is to develop synthesis processes for making hydrocarbon oils from coal which are more efficient than the German Fischer-Tropsch process, and to assist in providing the chemical and associated industries with raw materials produced from our indigenous resources.

A notable feature of this great research effort by the British coal industry is the benefit that will accrue to coal consumers through increased efficiency in utilisation. This will result, at first, in reduced consumption; but the industry is convinced that it will lead eventually to a greater demand for coal, just as research into electric lamps led to more light from less current and then to a colossal increase in the sale of electricity.

The vital problem that confronts British industry at the present time is that of translating the results of research into practice. The Association has decided that, unless the new scientific and technical discoveries were to outstrip our capacity to bring them to use, it must undertake to establish their commercial value by the trial manufacture of new appliances and the pilot plant operation of new processes.

A site for a central Coal Research Station has been acquired at Leatherhead. Building work is starting on an Engineering Research Station, and after the war laboratories and engineering plant is planned which will be the finest of its kind in the world.

A "new beginning" has been made during the year by the organisation of joint conferences at which important problems can be and are discussed with other scientific workers and with representatives of the coal-consuming interests.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

News from the Industry

Loss in Weight of Rice

The Ministry of Food have decided that as from January 9, 1944, and until further notice, all allocations of whole rice to first-hand distributors will be invoiced at shipping weight less 1 per cent. allowance for average loss in weight. This allowance is to be passed on to subsequent buyers in the chain of distribution, except where bulk is broken, in which case the seller breaking bulk will of course invoice at the actual weight delivered.

In order that a similar allowance may be made for points, the Ministry will raise no objection to the points value being calculated on the basis of the weight invoiced in accordance with the above.

No change in the Ministry's terms of sale is involved by the concession now announced, which is intended to compensate traders for any loss in weight occurring up to the point of delivery to the retailer, and which will continue in force for as long as the Ministry is satisfied that the loss in weight is occurring.

This allowance does not apply to releases from advance allocations invoiced prior to January 9, 1944.

* * *

The Rat Campaign

The campaign against the London sewer rate is progressing well. More than 500,000 rats have been destroyed, and it is possible that a final check will disclose the figure to be nearer 1,000,000.

The attack is being made in 3,000 miles of sewers. After a week of preparatory work, which included the laying of bait traps, the rats are given unpoisoned food for a few days, in order that any suspicions they might have would be lulled. On the fifth day poison is introduced. In a few weeks there will be further poisonings. New baits and new poisons will be used, and it is confidently expected by the experts engaged that most of the rats in the London sewers will be wiped out.

Dehydration Mission to India

With the concurrence of the Government of India the Minister of Food has sent a Dehydration Mission to India. The members of the Mission, Mr. T. C. Crawhall and Dr. J. C. Fidler, are officers of the Dehydration Division of the Ministry of Food, and will convey the latest technical information to those already engaged on dehydration projects, and to the Government Departments and military authorities concerned.

The Mission will make an investigation into the present production of dehydrated foods in India, the methods employed and commodities processed, and collect information on what is being done to stimulate the additional production of dried foodstuffs and what would be the requirements of machinery and plant for any such contemplated development. Attention will also be paid to the requirements of dried foodstuffs for the Forces which are supplied from India.

The Mission will make their report to the Minister of Food, who will make it available to the Government of India and will pass any relevant information to the Combined Food Board in Washington.

* * *

Alarm Clocks for Workers

The Board of Trade have made arrangements for the issue of buying permits for alarm clocks as far as supplies allow to workpeople whose employment makes it necessary for them to rise between midnight and 5 a.m., who do not already possess an alarm clock, and have no other means of being called early. Buying permits will be issued to such people in agriculture through the local branches of the National Union of Agricultural Workers, the Transport and General Workers Union, and the National Farmers Union. These unions will deal impartially with applications from members and non-members. Applications for permits should not be made to any other body.

Defence (Sale of Food) Regulation, 1943

The Ministry of Food recently directed the attention of all food manufacturers to Regulation 1 of the Defence (Sale of Food) Regulations, 1943, under which it became an offence, after January 1, 1944, to publish or to be a party to the publication of an advertisement which falsely describes any food or is otherwise calculated to mislead as to its nature, substance or quality, or, in particular, as to its nutritional or dietary value.

The Ministry is anxious that the prohibition of advertisements misleading as to the nutritional and dietary claims should be fully appreciated, and it looks with confidence for the co-operation of food manufacturers and advertisers in securing that the purpose of the Regulations is achieved.

* * *

Minister Thanks Food Trades

For four years of war members of the food trades have wholeheartedly co-operated with the Ministry of Food in helping to make sure that the food of the country has been equitably distributed. I am glad to take this early opportunity of thanking them for their untiring and patriotic work. They have had many heavy difficulties to overcome. By their success in overcoming them they have contributed much to the success of rationing and thus to the stability of our home front. They have earned the gratitude of the country, and when victory comes a share in it will indeed be theirs.

* * *

Fruit and Produce Exchange

Fruit and Produce Exchange of Great Britain announces a dividend of 25 per cent. on Ordinary and a bonus of 12½ per cent., both less tax, against 25 per cent. dividend and no bonus. Issued capital is £153,259, of which £28,259 is Ordinary 1s. shares. The company's Twenty per Cent. Non-Cumulative Preference (6s.) are quoted 12s. 6d.

Dried Foods from Rhodesia

The first orders from Britain for dehydrated foods from Southern Rhodesia have been received in the colony—one for dehydrated onions and the other for dehydrated Cape gooseberries.

* * *

Glasshouse Heating

Consequent on the issue of the new Horticultural Cropping Orders by the Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland, the Minister of Fuel and Power has made a new Direction governing the heating of glasshouses—namely, General Direction (Glasshouse Heating) No. 2 (S.R. and O. 1943, No. 1743) given under the Control of Fuel (No. 3) Order, 1942. This replaces General Direction (Glasshouse Heating) No. 1 (S.R. and O. 1943, No. 31).

Under this Direction, owners of glasshouses not situated on agricultural land are prohibited from using fuel for heat in their glasshouses unless either special permission has been obtained from the Minister or from one of his Regional Controllers, or the glasshouses are devoted to the production of tomatoes, lettuce, mustard and cress, endive, radishes, rhubarb, chicory or sprouting seed potatoes or the raising of young vegetables.

Any contravention of this Direction is an offence against the Control of Fuel (No. 3) Order, and proceedings will be taken against the owner of any glasshouses who uses fuel for growing flowers or other non-edible plants without a permit.

* * *

Dehydration in Scotland

Dehydration of potatoes may, in the post-war years, be the answer to the problem of seasonal surpluses, and the War Committee are anxious that the Scottish farmer's position should not be prejudiced through lack of suitable facilities. They have asked the Department of Agriculture to support an application made by them to the Ministry of Food for the opening of dehydrating factories in Scotland.

Pre-Packed Soya Flour

The Ministry of Food announces that on and after February 6, 1944, the sale of prepacked soya flour will be prohibited. Limited supplies of loose soya flour will, however, continue to be available at a price not exceeding 5d. per lb. retail.

* * *

Big Cinnamon Deal

Mr. F. Leach, Commissioner for Commodity Purchase in Ceylon, now back from London, will buy 3,000,000 lbs. of cinnamon in store on behalf of the British Ministry of Food.

He told Reuter recently that he felt his trip to London, where he had discussions at the Ministry of Food and at the Ministry of Supply, had been very useful.

The quotas fixed for different countries for the export of Ceylon cinnamon had proved too rigid, he said, as some wanted more and others less than the quotas assigned to them.

As a result of the discussions, these quotas had been made more fluid by the assigning of regional quotas within which each country could adjust its needs with others in the same group.

Mr. Leach believed that the cinnamon purchase, along with other measures, would help to relieve the congestion of cinnamon supplies in Ceylon.

* * *

Meeting the Fuel Shortage

To maintain output in face of curtailments in the coal supply is a major problem for factory management. But they have the solution in their own hands.

As the problem is an immediate one, nothing short of immediate savings can meet it. The Fuel Efficiency Committee of the Ministry of Fuel and Power is anxious to do everything possible to assist management in making both ends meet. A list of questions has therefore been compiled giving suggestions and information whereby immediate and considerable fuel savings can be made. Many of these suggestions are of things which management can carry out straight away by some fairly simple rearrangement or reorganisation. Among the matters which are being mentioned are: obvious sources of waste, reduction of work, making work easier, correction of heat, best use of heat, prime movers, etc. Almost every one of them will show a substantial saving from the very moment it is put into effect. The suggestions are backed by fuller information and technical details given in the Fuel Efficiency Bulletins.

* * *

Progress in Milk Scheme

The advisory committee responsible for supervising the National Milk Testing and Advisory Scheme has sent a message of thanks to all those concerned in the scheme, whether in laboratory or field, in appreciation of the excellent progress made since its inception in June, 1942.

Already, out of every 10 producers selling milk in this country between 7 and 8 are having their milk regularly tested; advisory facilities have been made available, and these extend also to dairies and depots. Much remains to be done, but it is generally recognised that the condition of the milk supply has improved as a result of the scheme.

Whatever other factors may play a part in post-war agricultural policy, it is certain that more and more milk will be needed to sustain the national dietary. Thus, the scheme is not only contributing materially to the war food production effort, but will play a valuable part in the post-war programme.

* * *

Price of Imported Onions

The Minister of Food has made an Order amending the Onions (Distribution and Maximum Prices) Order, 1943.

The Amendment came into force on December 21, 1943.

It increased the wholesale price of imported onions to 54s. per case of Spanish onions, and 50s. 6d. per cwt. when sold otherwise than in the original case.

The maximum retail price has been increased to 6½d. per lb. for imported or home-grown onions throughout the United Kingdom, including the areas in Scotland to which the Order previously did not apply.

Crop-Drying Progress

A series of exhibitions is being given by the technical association especially concerned with the all-important work of grain-drying and the conservation of other crops.

At a recent exhibition in Hertfordshire, visitors saw the grain-drying process from start to finish. A display of bread baked from varieties of wheat dried under proper conditions, and bread baked from flour milled from wheat subjected to improper treatment in the drier, made an interesting exhibit.

In conjunction with these loaves were doughs from various types of flour from which the starch had been extracted and the gluten left. It was thus possible to study the different types of gluten in conjunction with the corresponding breads and to see the effect of damaged grain from the millers' and the bakers' viewpoints.

Membership of the Farm Crop Dryers Association increases rapidly and now exceeds 200.

* * *

Canterbury Lambs to be Bigger

Mr. J. G. Barclay, Minister of Agriculture and Marketing, announced that New Zealand had received an urgent request from the United Kingdom for heavier meat shipments.

The Meat Board, he said, was in close consultation with the Government and was organising a campaign to increase the average weight of sheep and lamb carcases to assist in meeting the United Kingdom's needs.

A campaign with such a laudable object has the full support and approval of the Government, Mr. Barclay said. He appealed to all associated with the meat export industry to take every step possible to achieve the desired result.—*Reuter.*

* * *

Dried Onions from Nigeria ?

Dehydrated onions from Nigeria, British West Africa, may be another food contribution from the Colony to this country.

The Ministry of Food wants to try them, and is also interested in sun-dried onions from Nigeria.

Grey Squirrels

Grey squirrels are rapidly becoming a major pest in many parts of the country. They make serious inroads on our food supplies, and every effort should be made to destroy them.

* * *

Cattle Industry in Peru

A Bureau of Cattle Breeding has been formed for work connected with the cattle industry and to deal more efficiently with the pertinent problems. The import of pure-blooded reproducers and the distribution of stallions born and grown in the country have increased progressively. Over 200 bovine reproducers, 80 Angora goats, 20 Anglo-Nubian milking goats, and over 7,500 sheep, of which 1,500 have been advantageously sold by instalments to co-operatives for breeding purposes, have been imported. Designed to improve the development of native cattle, Official Genealogical Registers have been established, as well as Official Control Registers of the production of milking-cows. Notable improvements have been effected in the adaptation of foreign breeds.

* * *

U.S. Record Year

Mr. Claude R. Wickard, U.S. Secretary of Agriculture, said in the "U.S.-at War Edition" of the *Army and Navy Journal*, issued in Washington: "The total U.S. food production for 1943 is expected to exceed last year's record by 5 per cent., and will be 32 per cent. greater than the average production in the five pre-war years.

"The meat production is by far the largest on record and will be about 48 per cent. above the pre-war average."

Mr. Wickard reported similar increases in the milk and egg production.

He added: "All the programmes of the Department of Agriculture are now geared to the war effort. Soil conservation and protection and other activities are designed to help farmers maintain and increase the production of essential war crops and to protect our agricultural resources."—*Reuter.*

Raw Materials Guide

The second Supplement of the Raw Materials Guide contains in summary form references to the further Statutory Rules and Orders which have been issued since the publication of the previous Supplement.

There has been a further redistribution of commodities among the Branches, particularly those lately handled by R.M.2E, which branch has been absorbed into R.M.2A, 2B, and 2C.

The reader is invited to amend the Alphabetical List of Raw Materials on pages 81 to 89 in Supplement 1 from the revised lists given on page 113 of Supplement 2. There are no new Controls.

* * *

Storage of Wheat in Argentina

In Buenos Aires the committee for the distribution of corn has authorised, with the approval of the Ministers, the investment of 6,475,000 pesos for the execution of a government plan for the erection of vast underground silos for the storage of the Argentine wheat crop. Another 5,120,000 pesos have been granted in order to meet loading and carriage expenses and to cover against any decrease in the stock which may occur during the storage time. About one million tons of wheat will be stored. These silos will solve many difficulties facing the Argentine farmers who have no facilities for storing any large quantities. The specifications of the work will be revised by a committee of officials of the Ministry of Agriculture and the work will be supervised by a commission for the supervision of cereals.—*Reuter.*

* * *

Food as Payment to Journalists

Chinese writers and journalists should be paid by publishers a minimum of 1 lb. of rice for each 100 words, or 2 lb. of rice if surrendering copyright.

This suggestion from the Chinese Societies of National Art and Literature reflects the difficulties of writers in Chungking due to rising prices, states the *News Chronicle* correspondent.

Australia's Meat Ration

Australia's meat ration has been fixed at 2¼ lb. per person per week, it was officially announced recently.—*Reuter.*

* * *

Scots Food Preservation

A pamphlet, written by Mr. C. A. Oakley, *Looking at Tomorrow*, has recently been issued by the Scottish Council on Industry, and describes the industrial opportunities of Scotland.

In the opinion of the author, the greatly increased demand for preserved foodstuffs which has grown up during the war will be maintained. Scottish food manufacturers should be making up their mind what commodities they will preserve in the future, including national specialities such as venison, herring, grouse and hare.

Rubber manufacture is also regarded as an industry in which Scotland should be vitally interested.

* * *

Sea Fisheries Control

The draft convention drawn up at the International Fisheries Conference held in London in October has been published (Cmd. 6496, price 4d. net). Minimum sizes are specified for ten varieties of fish. Expressed in centimetres, they are: Soles, 21; plaice, witches, lemon soles, and megrims, 23; cod and haddock, 24; turbot and brill, 25; and hake, 30.

Fish caught in the waters covered by the convention which, from the tip of the snout to the extreme end of the tail fin, are below these lengths must be returned to the sea. Regulations are to be made so that the order is not evaded by having the head or other part of the fish removed.

The draft convention was drawn up for consideration by the Governments concerned before the holding of a further conference at which it would be formally signed. The countries represented at the October conference were Belgium, Canada, Eire, France, Iceland, Netherlands, Newfoundland, Norway, Poland, Portugal, Spain, and the United Kingdom. Observers attended from Denmark, Sweden, and the United States.

OBITER DICTA

● British housewives cannot try out powdered apple yet.—*Daily paper.*

● To the average child it has been a benefit to live during the war.—*Dr. Geoffrey Bourne.*

● I hope that by going to Canada I have saved my bacon.—*Colonel J. J. Llewellin.*

● The æsthetic attraction of white bread is not a thing to be despised.—"*The Arkady Review.*"

● Nowadays there is no longer any real danger from the use of colouring matter in food.—*Mr. C. H. Manley, Leeds City Analyst.*

● I am afraid the ladies and catering chefs have not mastered the cooking of the dried eggs.—*Mr. A. I. Drysdale at Aberdeen.*

● The task of building the kind of world which modern science has made possible is so great that some faint-hearted people are beginning to doubt whether it is possible.—*Sir John Orr.*

● "Hot Beveridge" means a hot beverage in which added sugar is customarily consumed, whether served alone or with a meal, but it does not include spiritous beverage.—*Form G385(e) Ministry of Food.*

● We have a new Food Minister, Colonel Llewellin, and it is high time he was told the publicity from the Ministry of Food to the public was a positive disgrace.—*Mr. James M. Brown, President of the Glasgow Grocers and Provision Merchants Association.*

● The record of the promotion and sale of vitamins represented one of the most extraordinary examples of gigantic promotion beyond established merit that has ever been known in the field of medicine.—*Dr. Morris Fishbein, editor of the "Journal of the American Medical Association".*

● People will doubtless continue to rinse rice before boiling it and thus lose vitamins put on the surface. We can tell people to do otherwise, but they will continue to do as their mothers taught them. If anybody changes it will have to be the producer.—*Dr. R. R. Williams, of the National Research Council, U.S.A., speaking to a convention of rice millers.*

Vinegar from Bananas

Vinegar, which is in short supply in Bathurst, Gambia, is now being made from bananas and palm wine.—*Reuter.*

* * *

Sugar Technology Research

The setting up of pilot plants to produce food yeast, butyl alcohol, acetone, glucose, and cane wax has been recommended by the Advisory Board of the Imperial Institute of Sugar Technology, which met recently in Cawnpore, and reviewed the work of the Institute during the past year. The Institute has done research on the production of glucose, food yeast, butyl alcohol, acetone, activated carbon, cane wax, refined sulphur, and power alcohol, besides giving technical assistance to sugar factories and to the Government on matters relating to the sugar industry. The Board also approved a research programme which includes the making of cellulose and plastics from bagasse, of filter aids from pressmud, and of potash, citric acid, and lactic acid from molasses.

* * *

Eels as Food

One form of food production which the authorities are encouraging will not be much use to Britain until long after the war—say in five years' time, states *Manchester Evening News.*

It is the multiplication of eels, and for some months past fishery experts have been doing their best to revive our ancient eel-fishing industry.

They have arranged special demonstrations of modern methods in eel-fishing in this and many other parts of the country. Eel traps at river mouths, long derelict, are being modernised and repaired.

"Much restocking of rivers has taken place, and millions of young elvers are busy fattening themselves up in selected rivers to provide post-war eel pies in three to five years' time."

An official Ministry of Agriculture and Fisheries statement said: "We are most anxious to revive the industry, which in many areas has been allowed to die out. Eels form a most nutritious food with a high vitamin content."

Auxiliary Gas Firing

In some cases in smaller food factories it is a good proposition, but depending of course on the local conditions, to use a proportion of town gas for the operation of steam boilers already fired by coal or coke.

In this connection notable work is being carried out by Liptak Furnace Arches, Ltd., using one or other of the wide range of their "Gako" low-pressure turbulent burners. These are just as suitable for small volumes of any combustible gas for the operation of boilers of any size as they are, for example, for large volumes of blast furnace, producer gas, and similar gas for water-tube and large cylindrical boilers, whether for gas firing only or in conjunction with solid and liquid fuel.

One general design of these burners for internally fired cylindrical boilers is on the saddle-shape principle with natural draught, being fixed to the top of the furnace tubes of the boiler above the doors, used for hand firing, which is carried on as usual. For example, two of the latest installations of this type, one in South Wales and one in Yorkshire, are for large "Lancashire" boilers, 30 ft. by 9 ft., with 39-in. diameter furnace flues, the normal evaporation being 8,000 lbs. per hour when burning fairly low grade coal. The furnace tubes have been lined for about 3ft. with 3-in. thick firebrick, so as to avoid excessive impingement of the gas flame, although it may be stated that one of the main advantages of these burners is extremely uniform flame temperature because of the intimate mixing of the gas and air and the low pressure. Incidentally the introduction of this refractory lining results in no appreciable reduction of net heating surface, and tends to increase efficiency of the coal combustion.

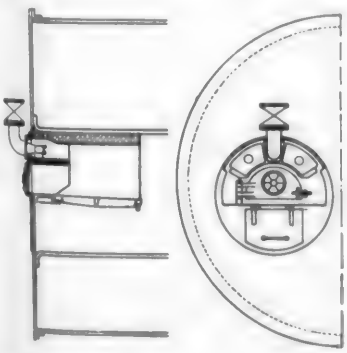
These burners embody separate and independent valve control of the air and gas supply, which are split up in the burner into a number of thin layers or streams, which are given a whirling motion by spiral guides or passages. Pressure operation does not exceed 2 to 4 inches W.G., which, as already indicated, eliminates all stratification or non-uniform temperature, giving a short globular flame, while operation is by means of natural draught or forced draught with air supply by integral fan with electric motor. Often this latter is the most convenient and efficient method and lends itself particularly well to automatic control.

* * *

Magnetic Type Tachometer

In the production and packing of food, different kinds of machines are used, which are invariably operated by rotary motion, in the form of revolving shafts, wheels, pulleys, or gears. To ensure maximum output the control of such rotary motion is important. The form which output takes varies with the nature of the industry concerned, and may be calculated in units, inches, gallons, bottles, threads, picks, etc.

In bakeries, bottle factories, packed-food factories, etc., the jewelled and compensated Magnetic Type Tachometer of the Cooper-Stewart Engineering Co., Ltd., can be employed with highly profitable results. The mechanism of this instrument is remarkable in design and construction. It responds instantly to the slightest variation of driving speed, and accurate reading is secured over the entire scale of calibration. It depends for its action upon the drag imparted to an aluminium cup by a magnet rotating within it. The cup and the indicating pointer are mounted on a spindle which rotates in jewel bearings; a fine hair-spring returns the assembly to zero and forms the load opposing the magnetic drag. Internal gearing actuates counter mechanism where a *record of the revolutions* is required in addition to *speed indication*. The standard instrument has a range from zero up to 2,000 r.p.m. Calibration, such as "feet per minute", etc., can be arranged, and it is only required to find some convenient point from which to take the drive, which possesses a definite relationship to the measurement to be indicated.



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"Automatic" Accounting

For the production of office records the "Hollerith" method of accounting of the British Tabulating Machine Company, Ltd., is a notable one. Every event, every transaction, as it takes place, is made the subject of a separate card in which the information is recorded by punched holes. Electrical contact through these holes enables a sorting machine to arrange or classify the cards in any desired order at the phenomenal speed of 400 card passages a minute, or 24,000 per hour. A final operation, performed by a tabulating machine, produces from these sorted cards any kind of accounting or statistical document in plain figures without pen having been put to paper.

The method is suitable for production Control, Stock Records, Invoices, Statements, Ledgers, Cost Summaries, Pay-rolls and a host of other purposes. After the initial punching of the cards it is true to say that accounts and statistics are produced untouched by hand, with considerable saving in man-power and with complete mechanical accuracy.

* * *

Multiple Potato Eyeing Machine

An ingenious multiple potato eyeing machine, equipped with ten rotating heads driven by a ½-h.p. motor, with a ⅜-inch "V" leather belting, is that of Maurice Lee Unger. Each revolving head consists of a peculiarly shaped knife, on the back of which a small carborundum disc is mounted.

The eyeing process itself is performed by the operator holding the potato with both hands against the rotating knifelike cutting tool. This is done very quickly and accurately, once the operator learns to sense the pressure to be exerted against the knife, depending on the size and

depth of each eye; to acquire such skill takes but a very short time.

During the process of peeling, very frequently minute pieces of skin are left on the potatoes, and the carborundum disc fitted on the back of the revolving head is used with great success to remove such specks or spots.

* * *

Automatic "Taring" Scale

An ingenious "taring" scale invented by Mr. A. H. Hewitt is described in the *Worksop Guardian*. It has two charts on the dial; the inner one is fast and the outer one revolves by the aid of a handle. If, for example, it is desired to fill 7 lbs. net into a jar, the latter is placed empty upon the scale. This brings the inner dial finger to the weight of the jar (say, 4 lbs.). The chart scale is then adjusted by the handle to the finger, and the 7 lbs. is weighed on the outer scale. Such a device obviously saves much labour in bakeries and in packing, bottling, and canning departments. It is estimated that when filling "sevens", as in the example given, the operative is saved lifting over 12½ tons a day of eight hours. All capacities may be dealt with on bench or counter scales, and from 150 lbs. to 100 tons on floor machines.

* * *

Inner Puffed Cereal

According to U.S.P. 2,289,529 (J. J. Thompson, Assessor to Kellogg Co.) a cereal product having a smooth outside surface and puffed interior as compared with the original grain is prepared by: (*a*) soaking the grain (*e.g.*, maize) in 5 to 20 per cent. aqueous NaCl, sucrose or other soluble flavouring for 2 to 24 hours; (*b*) cooking the grain with live steam in a rotary cooker (*e.g.*, at 7 to 45 lbs. per sq. in. for 25 minutes to 1 hour) and then cooling; (*c*) adjusting the water to 28 to 35 per cent. and modifying the thickness of the grain so as to deform it internally (*e.g.*, by passage through the light nip of flaking rolls); (*d*) adjusting the water to 8 to 12 per cent. (*e.g.*, by drying at 21° to 66° C. for about 6 hours); and (*e*) puffing the flattened grain at from 260° to 315° C.

Industrial Hygiene

A brochure on the Izal System of Industrial Hygiene, with numerous illustrations and a wall chart, has been issued by Newton, Chambers and Co., Ltd.

The Izal system, taking the minimum requirements of the Factories Act of 1937 and subsequent Statutory Rules and Orders as a basis, visualises the routine necessary to ensure healthy and comfortable conditions for the workers.

The main objects of the system are (*a*) to identify danger points of infection in factory buildings; (*b*) to advise how these may properly be treated so that any chain of infection is broken; (*c*) to assist in training employees (including cleaners) in the proper use of disinfectants; (*d*) to assist in encouraging hygienic habits and practices and to advise upon antiseptic precautions; (*e*) to advise, where necessary, on special problems such as insect pest extermination and kitchen refuse disposal; (*f*) to supply the materials necessary for maintenance after installation.

The system is flexible and can be operated as easily where there are 10,000 operatives as where there are 150.

* * *

Paper Apple Box

A new packaging development is described in *Pacific Pulp and Paper Industry*, U.S.A.

It is a paper apple box or "fruit cradle". It is said to have proved its utility and economy under every condition of packing, shipping, storing and merchandising. From the wood economy standpoint the importance of the saving is emphasised by the request of the War Production Board for the replacement of at least 25 per cent. of wood box requirements.

While the rigidity of wood is essential in a fruit container, it has been found that a wood superstructure (of low quality spruce, white pine or hemlock) gives ample strength, though needing only a small percentage of the quantity of material generally used in the all-wood box.

In the paper box the bulge of the upper layer of fruit is cradled in the underside of a double-top covering. This top, divided down the middle, is formed by turning under each half-section, thus forming a springy cushion into which the fruit may press with minimum damage to the fruit and without starting a bulge on the outer side of the cover (this is the reason for the name "fruit cradle" because the fruit is cradled as though it were held between the palms of both hands).

* * *

Fierce Legal Battle

A fierce legal battle was fought at Slough Police Court recently, when for six hours a special bench of magistrates listened to a case which originated almost a year ago and had been adjourned from time to time. The case revolved round the presence of sulphur dioxide in a drink sold as a "cordial" and also whether it was a cordial or not—a now familiar problem.

Early on it was submitted for the defence that the case was out of time and that, if a prosecution could be launched any time, providing the information was laid within the specified period, there was nothing to stop a summons suddenly being issued on an information laid five, ten, or twenty years ago.

The county analyst stated that he had analysed the sample sent him and found it contained 98·4 per cent. water and 114 parts per million of sulphur dioxide, together with coloured flavouring. There was no fruit juice, sugar or alcohol in the beverage, and it was therefore not a cordial, and no preservatives such as sulphur dioxide could be used.

Several analysts corroborated this opinion, and the only witness for the defence was another public analyst, who considered that a cordial could be either sweetened or unsweetened and that the product was in order in containing preservatives. The main interest of this case is the matter of the delay which took place between laying the information and the issuing of the summons. Pressed by the defence, the county food inspector declared that he had laid the information at Slough Police Court at a date in January, 1943.

Major Egbert Cadbury

Major Egbert Cadbury, of Oakleigh, Leigh Woods, Bristol, has been elected a director of Lloyds Bank.

Member of the well-known cocoa family, Major Cadbury is a managing director of the British Cocoa and Chocolate Company, Ltd., and a director of J. S. Fry and Sons, Ltd. He is also on the boards of E-M-B company, the Bristol Gas Company and Princes Theatre, Ltd.

* * *

The Nutrition Society

Two whole-day conferences have been arranged on "Budgetary and Dietary Surveys of Families and Individuals," the first to be held on February 5, 1944, and the second at about the beginning of May.

The first will be held at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C. 1.

Budgetary and Dietary Surveys of Families and Individuals.

Part I.

(1) Methods of Budgetary and Dietary Surveys.
  (*a*) Budgetary Analyses.
  (*b*) Dietary Analyses.
  (*c*) Division of Food Among the Family.

(2) The Organisation of Large-scale Surveys.

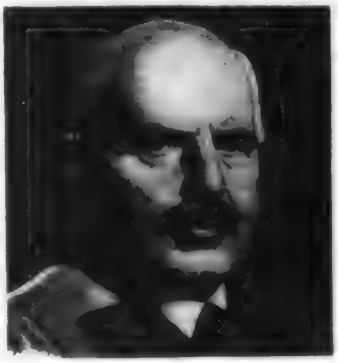
(3) The Statistical Validity of Methods Used in Budgetary and Dietary Surveys.

(4) Relation of Expenditure on Food to Other Family Expenditure.

The chair will be taken by Sir John Orr, and among those who have accepted invitations to participate are Mr. A. G. Jones (Ministry of Food), Dr. E. R. Bransby (Ministry of Health), Mr. F. le Gros Clark (Children's Nutrition Council), Mr. L. Moss (Wartime Social Survey), Prof. Major Greenwood, F.R.S. (London School of Hygiene and Tropical Medicine), Dr. A. Bradford Hill (Air Ministry), Prof. A. L. Bowley (Institute of Statistics, Oxford), Mr. D. Caradog Jones (School of Social Sciences, University of Liverpool), Dr. E. H. M. Milligan (Medical Officer of Health and School Medical Officer, Glossop).

Mr. Edward Cadbury

Mr. Edward Cadbury, chairman of Cadbury Brothers, Limited, retired recently, having completed exactly half a century with the firm. He joined his father and uncle, the late George and Richard Cadbury, on January 1, 1894, and when on the death of the latter in 1899 the business was converted into a limited company he became managing director. He was appointed chairman of the company in 1932 and of the board in 1937. He was also chairman of the British Cocoa and Chocolate Company, Limited. He was a director of J. S. Fry and Sons,



Limited, for a considerable period, and is a director of the Daily News Limited.

He has been succeeded as chairman of the company and board of Cadbury Brothers, Limited, by Mr. Laurence Cadbury, eldest son of the late George Cadbury and Dame Elizabeth Cadbury. He entered the family business in 1911, and was appointed managing director on returning from France in 1919.

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Sir Francis Floud

The Minister of Agriculture has appointed Sir Francis Floud, K.C.B., K.C.S.I., K.C.M.G., as the new chairman of the Agricultural Wages Board, successor to Lord Roche, who has just retired. Sir Francis served as Permanent Secretary of the Ministry of Agriculture from 1920 to 1927, as Chairman of the Board of Customs and Excise from 1927 to 1930, and as Permanent Secretary of the Ministry of Labour from 1930 to 1934. Later he was appointed High Commissioner in Canada for the United Kingdom and held this post until 1938.

New Year Honours

Among the New Year Honours (which were announced after the January issue of FOOD MANUFACTURE had gone to press) are the following:

Knights Bachelor: Professor J. C. Drummond, scientific adviser, Ministry of Food; Professor F. L. Engledow, Professor of Agriculture, Cambridge; Dr. J. J. Fox, F.R.S., Government Chemist; T. R. Merton, scientific adviser, Ministry of Production; J. G. Nicholson, deputy chairman, Imperial Chemical Industries, Ltd.

C.B.E.: W. A. Akers, a director of research, D.S.I.R.; Lieut.-Colonel E. Briggs, president, Soap and Candle Trades Employers Federation; A. N. Drury, lately member, scientific staff, Medical Research Council; Dr. W. H. Glanville, a director of research, D.S.I.R.

Royal Victorian Order: Brig.-General Sir Harold Hartley, F.R.S.

M.B.E.: F. R. Johnson, Government Chemist, Gold Coast; Lieut.-Colonel Haider Khan, Professor of Chemistry, Aligarh Muslim University.

O.B.E.: J. King, superintendent chemist, Government Chemists Department, seconded to War Office; J. G. King, director, Gas Research Board.

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Mr. James V. Rank

Mr. James Voase Rank has been elected chairman of Joseph Rank, Ltd., in succession to his father, the founder, who died in December. Recently he became chairman of Ranks, Ltd. Among his other directorships are those of Great Western, Fishguard and Rosslare, Rank's (Ireland), Grain Union, Buchanan's Flour Mills, Hughes Dickson, and Weaver and Cox.

* * *

Judge William Stewart

Major Lloyd George, Minister of Fuel and Power, announces that, with the concurrence of the Lord Chancellor, he has appointed Judge William Stewart to be Regional Controller for the North-Eastern Region in place of Dr. H. S. Houldsworth, K.C., whose appointment as Controller-General of the Ministry was recently announced.

Veterinary Supervision

Dr. W. R. Wooldridge, in the presidential address to the National Veterinary Medical Association, said there were about 2,500,000 dairy cattle under no regular veterinary supervision.

* * *

Dr. C. Bryner Jones

Dr. C. Bryner Jones, C.B., C.B.E., will retire from the post of Welsh Secretary to the Ministry of Agriculture on March 31, 1944, and will be succeeded by Mr. J. Morgan Jones, Registrar of the University College of Wales, Aberystwyth, who will shortly take up his duties. Dr. Bryner Jones will continue to act as one of the Minister's liaison officers for Wales.

OBITUARY

Dr. John Kellogg

Dr. John Harvey Kellogg, the famous "cereal king" and health-food manufacturer, who established Battle Creek Sanatorium, one of the most famous institutions of its kind in the world, has died at Battle Creek, Michigan, U.S.A., at the age of 91.

Battle Creek Sanatorium was first owned by the Seventh Day Adventist Church, and Mr. Kellogg, in his early days a practising physician, took over when financial difficulties arose, and made it successful. Later he launched the business of manufacturing health foods which made his name a household word.

He still performed operations when in his seventies, and during the later years of his life founded three schools in connection with the sanatorium—a training school for nurses, a school of home economics and a Kellogg school of physical education.

For more than half a century he slept out of doors, and was a militant leader in the health movement which bans meat and emphasises the value of grains, fruit and vegetables.

Dr. Kellogg was a pioneer of the therapeutic value of electric light and the inventor of an electric light bath.

A member of many medical associations and societies in the United States, and of the Royal Society of Medicine in England, he edited the magazine *Good Health* for many years, and was the author of numerous books.—*Reuter.*

* * *

Mr. John Henry Yates

Mr. John Henry Yates, who died at Blackpool, was connected with United Cattle Products, Ltd., Manchester, for forty-five years. From 1936 he was director and secretary. When war broke out he was appointed joint controller for the north-west area of Associated Tripe Dressers, Ltd., working in close conjunction with the Ministry of Food.

* * *

Mr. William Radford

The death has occurred at the age of 85 years of Mr. William Radford, for 30 years manager to Messrs. Allen and Hanbury, of Ware. He joined the firm in 1878.

COMPANIES

Lever Bros. and Batchelors Peas

The Stock Exchange Committee has permitted dealings in £383,166 Ordinary stock of Lever Brothers and Unilever and ordered the securities to be quoted in the Official List.

This represents the first allotment of stock in connection with the offer for Batchelors Peas announced early in November. The offer consisted of £1 nominal of Lever stock, plus 1s. 6d. in cash, for every two Ordinary shares of Batchelors Peas. The Ordinary capital of the latter consists of 1,280,000 shares of 5s. each.

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Tate and Lyle, Ltd.

The forty-first annual ordinary general meeting of Tate and Lyle, Ltd., was held in December, Sir C. E. Leonard Lyle, Bt., M.P. (the president), in the chair.

The following is an abstract of the president's statement, which was taken as read:

Your company continues to work under the direction of the Ministry of Food, and under present conditions it is still considered inadvisable for me to follow my usual practice of presenting to you at the annual meetings a detailed account of the activities and finances of the company and its subsidiaries. I will therefore ask the stockholders to accept the report and accounts without further detailed comments.

The president moved the adoption of the report and accounts for the 53 weeks ended October 2, 1943, and the approval of the dividend recommendations in the report, including a final dividend of 10 per cent. on the Ordinary shares, making 13½ per cent. for the year, subject to income-tax, which was carried unanimously.

The retiring directors, Sir C. E. Leonard Lyle, Bt., M.P., Mr. G. Vernon Tate, Mr. Philip Lyle and Mr. Ian Duff Lyle, were unanimously re-elected, and the auditors, Messrs. Edmund D. White and Sons, reappointed.

Guarding Food Supplies

Elaborate precautions have been taken by the Ministry of Food to protect Britain's food supplies—stored in various parts of the country—against destruction by fire. At each of the sixteen divisional food headquarters throughout the country the Ministry has set up a fire prevention organisation, whose job it is to see that an outbreak does not threaten vital supplies.

The majority of the fire officers in the organisation are either ex-N.F.S. men or fire insurance surveyors, and their duties consist of advising the Ministry of structural alterations for preventing or limiting the effects of fire and to ensure good housekeeping. The Ministry has issued a code of fire prevention to their fire officers, and in the past six months, since the organisation was set up, a great improvement has been achieved in the Ministry's premises.

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U.S. Wheat Prospects

The Department of Agriculture estimates the U.S. winter wheat acreage at 47,127,000 acres, places condition at 69 per cent. (against 88) and possible production at 526,957,000 bushels (against 624,503,000 estimated a year ago and an actual crop of 529,606,000). Rye acreage is 4,922,000 (against 5,933,000) and condition 76 (against 86).

Information and Advice

Yeast Extract Production

9,023. *Required, information on the production of yeast extract by acid hydrolysis, neutralisation, etc., and flavouring with vegetables. Source of supply of chemicals, dried vegetables, and extracts. Source of supply of vegetable extracts giving meat flavour.* (Yorks.)

The modern technique of production can be divided into six parts :

(1) Hydrolysis of the yeast by hydrochloric acid.
(2) Filtration of the liquor obtained from (1).
(3) Concentration of the filtrate, during which much of the hydrochloric acid is boiled off and condensed.
(4) Neutralisation of the residual hydrochloric acid.
(5) Filtration to remove salt crystals.
(6) De-bittering the product at a suitable stage of process.

The names of suppliers of chemicals, etc., were given.

Ghee Butter

9,031. *Required, a formula for the manufacture of Ghee Butter.* (Herts.)

Milk, or cream from milk, is allowed to sour. The sour product is churned into butter, which is separated from the butter-milk. This butter usually has a high moisture content, since it is not worked. Often the butter is separated in such a consistency—owing to high temperature—that it cannot be worked. Sufficient of this butter is collected from successive churnings to merit a " ghee boiling."

There are two main steps in the subsequent ghee preparation and refining processes—namely, (*a*) the " boiling ", and (*b*) the " heating " of the ghee.

The boiling of ghee consists of heating the above-mentioned butter directly over a fire until the butter-fat settles out and the water of the butter is completely boiled away. This may be done on a small scale in brass household vessels, or on a large scale in iron boilers. The moisture is first completely boiled away, and the fat is then heated until the curd starts to brown slightly. This occurs at about 116° C. The temperature of heating in this process should not exceed 123° C. The solid curd is then allowed to settle while the ghee is cooling. The slight scum on the fat is skimmed off and the pure fat separated by decantation or ladling off. This is the ghee in crude form.

It has still to be separated from small quantities of curd. Country ghee is usually bought from the cultivators in the above-mentioned crude form and is subjected to a " heating " process in bulk quantities so as to purify it further and to blend it. This is done by melting the ghee and pouring it into larger boilers—according to the desired blend. It is then heated to a temperature not exceeding 80° C. with stirring. Then fine particles of curd are allowed to settle and the clear ghee is strained through fine cloth (muslin or linen) into the tins. The ghee is then ready for market in its refined form.

The boiling of ghee is an essential step, since it sterilises the fat, is the only way to obtain the maximum yield from the butter, and confers part of the aroma and flavour of slightly burnt curd to the ghee.

Information Supplied

8,928. *Plant for production of soya flour and grits.* (Yorks.)

8,929. *Installation of factory lift.* (London.)

8,935. *Manufacturers of potato flour.* (London.)

8,940. *Information on meat extract manufacture.* (Eire.)

8,947. *Advice concerning experiments on and equipment required in food dehydration.* (Oxford.)

8,949. *Suppliers of two bench vacuum filling machines for powder or cream.* (London.)

8,950. *Manufacturers of herring boning machine described on p. 341 of the October issue of* FOOD MANUFACTURE. (Oxford, Glasgow, etc.)

8,955. *Manufacturers of canning machinery and tins suitable for packing sardines and similar class of fish.* (Eire.)

8,959. *Firms manufacturing stains.* (Cambs.)

8,960. *Manufacturers of cotton bags suitable for packing self-raising flour.* (Yorks.)

8,961. *Suppliers of potato flour and dehydrated potatoes.* (Kent.)

8,971. *References to soya bean casein.* (Essex.)

8,974. *Suppliers of bakery machinery.* (Malta.)

8,975. *Information relative to the emulsification of essential oils.* (Yorks.)

8,981. *Suppliers of starch substitutes.* (Warwicks.)

8,982. *Information concerning the production of a sweetened rose hip solution.* (Eire.)

8,995. *Names of firms manufacturing flavouring essences.* (N. Ireland.)

9,010. *Firms supplying instruments for gauging or measuring the amount of liquids in tanks.* (Yorks.)

9,012. *Firms manufacturing equipment for aerated water industries.* (Egypt.)

Information Required

9,022. *Information on the manufacture of pectin; also the manufacture of non-alcoholic juice for soft drinks.* (Wales.)

9,078. *Any anti-oxidant used to retard discoloration in whey paste* (50 *per cent. solids*) *stored in* 50-*gallon barrels and utilised for bakery purposes.* (London.)

9,079. *General information about the milk substitute manufactured and distributed in Great Britain under the name " Macol "—i.e., manufacturers, nature of the product, use, etc.* (Illinois.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements relating to the Manufacture of Edible Products from Soya Beans

The object of the invention is to provide a new or improved product made from soya beans which contains practically all of the nutritive elements of the soya bean and is in a physical form which renders it particularly suitable for use in the preparation of a variety of foodstuffs.

The invention comprises the production of an edible product from soya beans by treating comminuted soya beans with water at a temperature of 100° C. or thereabout and with a soya protein coagulating agent at a temperature between 50 and 100° C. or thereabout, and by separating the insoluble material which constitutes the edible product from the liquid.

The soya protein coagulating agent may be an innocuous water-soluble acid, *e.g.* hydrochloric acid and citric acid, or acid salt, *e.g.* cream of tartar, calcium acid phosphate and sodium acid sulphate, or an innocuous water-soluble salt of iron, calcium, magnesium, sodium, potassium or ammonium, or a mixture of any of these, all these substances being used in such concentrations that they act as coagulants.

In one convenient method of carrying out the process, soya bean flour is mixed with water and one or more of the coagulating agents mentioned above, and the mixture is boiled in order to effect coagulation. The mixture is then filtered.

As a variation of the above procedure, a mixture of soya bean flour and a coagulating agent may be treated with a suitable quantity of boiling water; or the soya may be treated with a boiling aqueous solution of the coagulating agent.

When an acid or acid salt is used as the coagulating agent, the quantity employed should be such as to bring the *p*H of the boiled suspension within the range of 3·5 to 6. If a neutral salt with or without the addition of an acid or acid salt is used, the *p*H of the suspension may be adjusted by the addition of alkali so that it is as high as 7·5. The quantity of a salt of iron, calcium, magnesium, sodium, potassium or ammonium may vary from 1 to 15 per cent. of the soya flour. The amount of coagulant and the *p*H range in which coagulation takes place will depend on the coagulant used.

If the soya has previously been treated, as by a wet or dry heat treatment, with the result that the solubility of the protein thereof is reduced, then in order to obtain a good yield of our improved product, the soya should be treated in aqueous suspension with alkali, preferably in the cold, at a *p*H not exceeding 11 in order to dissolve the protein. The *p*H should then be adjusted to between 6·5 and 7·0. The temperature of the mixture is then raised to 100° C. or thereabout and the coagulating agent added, after cooling if necessary, at a temperature between 50° and 100° C. or thereabout. In this case, when an acid or acid salt is employed as a coagulant, the quantity should be adjusted so that the *p*H of the boiled suspension lies between 5·5 and 2·0. If a neutral salt with or without the addition of an acid or acid salt is used, the *p*H of the suspension may be as high as 7·5.

551,692. The British Arkady Company Limited, Walter Percy Ford, William Edward Egerton and Alan Mulcock Maiden.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

552,877. MOORE, H., and CHARLTON, H. E.: Vacuum pumps.

552,896. MORGENTHALER, M. R., and INREDECO, INC.: Process for obtaining clear extracts from semi-liquid mixtures.

552,971. KATZ, A.: Impact crushing mill.

552,982. CARNEGIE-ILLINOIS STEEL CORPORATION: Method of electroplating with tin and alloys thereof.

553,040. NECKAR WATER SOFTENER CO., LTD., and PILLINER, A. P. H.: Proportional mixing of liquids.

553,068. FIRMIN, I. F.: Confectioners' kit for use in icing cakes and confectionery.

553,095. LOWE CORPORATION, J.: Extrusion devices, for example for extruding raw doughnuts.

553,123. SUN-O-LIFE CO., LTD., and CHAMBERS, H. B.: Production of a beverage containing carrot as its chief constituent.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

KIDDS.—622,313. *Advertised before acceptance. Section* 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **Samuel Kidd and Co., Ltd.,** Bankside House, Leadenhall Street, London, E.C. 3; Millers. To be Associated with No. B428,810 (2326) xlii and others.

RIGBYS.—622,318. *Advertised before acceptance. Section* 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **Thomas Rigby and Son, Ltd.,** 5, Fenwick Street, Liverpool, 2; Millers. To be Associated with No. 417,827 (2290) xlii and others.

WEAVERS.—622,326. *Advertised before acceptance. Section* 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **Weaver and Co., Ltd.,** Swansea Flour Mills, Swansea; Millers. To be Associated with No. 622,327 (3395) xxxi and another.

New Companies

Vaccine Private Immunisation Clinic and Research Laboratories, Limited. (380518.) 8, Buckingham Palace Gardens, S.W. 1. Nom. cap.: £1,000 in £1 shs. (300 "A" and 700 "B"). Dirs.: H. H. Murray, White Lodge, Tadworth, Surrey; W. R. Oliver, Old Orchard, Ashley Road, Epsom; Miss C. Brady, Lime Heath, Potters End, Berkhamstead, Herts.

Dowds' Mineral Waters, Limited. (380522.) 37, Hillkirk Street, Beswick, Manchester. To take over a bus. cd. on as "Patrick Dowd" at Beswick, Manchester. Nom. cap.: £10,000 in £1 shares. Dirs.: B. Dowd, 37, Hillkirk Street, Beswick, Manchester; Eda Dowd and J. A. Dowd, both of 843, Chester Road, Stratford, Lancs.

W. Ladbrook and Son, Limited. (380530.) The Mill, Elmsett, Ipswich, Suffolk. To take over the bus. of millers and corn merchants cd. on as "W. Ladbrook and Son" at Elmsett. Nom. cap.: £10,000 in £1 shares. Dirs.: A. E. Ladbrook and Sybil M. Ladbrook, both of Laurel Cottage, Elmsett, Ipswich; J. E. W. Ladbrook and Muriel Ladbrook, both of The Malting, Elmsett, Ipswich.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.